STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS

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(MAY, 2020)

DECLARATION

I declare that the thesis entitled "**STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS**" has been prepared by me under the guidance of **DR. G S WANDER**, Professor & Head, Department of Cardiology, Dayanand Medical College and Hospital, Ludhiana. No part of this thesis has formed the basis for the award of any degree previously.

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TO

MY

MOTHER

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Dr Gurpreet Singh……...

ABBREVIATIONS

AOBP	Automated Office BP(BP reading taken on Watch Office,Microlife in Office)
BP	Blood Pressure
DBP	Diastolic Blood Pressure
D	Decrease in BP readings
ECG	Electrocardiogarm
F	Female
H	Increase in BP readings
HBPM	Home BP Monitor(BP reading taken on Watch homeA, Microlife at home)
LVH	Left Ventricular Hypertrophy
M	Male
N	No change in BP readings
Mm hg	Millimeter of mercury
OFF	Office
OABP	Office Automatic BP(BP reading taken On Watch homeA Microlife in Office)
OMBP	Office Manual BP(BP reading taken on Manual(Aneroid) Appratus) in office by observer)
SBP	Systolic Blood Pressure

ABSTRACT

Introduction: There is evidence that AOBP is a better predictor of target organ damage than attended office BP.AOBP readings are correlated with AHBP readings in different studies and found to be valuable in monitoring of a blood pressure in clinic. AOBP eliminates the effect of observer and effect of white coat hypertension minimized in clinic.

Aims of the study: In this study our aim was to Study to compare the home, office and automatic office blood pressure recordings.

Materials and methods: 200 OPD person normotensive or hypertension stage 1 and hypertensive stage 2 and3 those are stable on treatment since one month included in the study. First blood pressure recordings done by the participants ON Watch BP home A (Microlife) IN HOME FOR 3 DAYS LABEL AS HBPM.

. Blood pressure readings recorded stored digitally in apparatus memory.

On the 4th day, participants come to the office ,AOBP, OABP AND MOBP READINGS TAKEN

. All the data recorded on a Performa sheet and analyzed.

Results: The outcomes were analyzed for 200 patients. BP readings on AOBP in office shows mean of SBP readings and mean of DBP readings of all participants are 126.53+_12.02 mm hg and 77.86 +_8.24 mm hg respectively.

.Mean readings take on Manual apparatus are approximate 5.80+-8.39 mm hg and 4.31 ± 7.37 mm hg are higher than AOBP readings for SBP and DBP respectively .

CONCLUSION: In our study it is observed that readings taken on Office manual BP (OMBP) are 5.80+-8.39 mm hg and 4.31 ± 7.37 mm hg are higher than Automated office BP (AOBP) readings for SBP and DBP respectively and AOBP readings are 9.4±6.20 mm hg and 6.15±4.84 mm hg higher than Home BP measurements (HBPM) readings for SBP and DBP respectively.

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INTRODUCTION

Hypertension is one of the important public health problems. Hypertension is defined as the presence of a blood pressure elevated to a level that places patients at increased risk for target organ damage in several vascular beds. Clinically hypertension is characterized by a blood pressure more than 140/90 mmHg. [1] It is common, asymptomatic, readily detectable, usually easily treatable, and often leads to lethal complication if left untreated.[2]

JNC VII Classification of Hypertension [3]

Category	**Systolic Blood Pressure (mmHg)**		**Diastolic Blood Pressure (mmHg)**
Normal	<120	And	<80
Prehypertension	120–139	And	81–89
Hypertension			
Stage 1	140–159	Or	90–99
Stage 2	≥160	Or	≥100

European Hypertension Guidelines[4]

Category	**SBP(mmHg)**	**DBP(mmHg)**
Optimal	< 120	<80
Normal	120-129	80-84
High normal	130-139	85-89
Stage 1 hypertension	140-159	90-99
Stage 2 hypertension	160-179	100-109
Stage 3 hypertension	>180	>110

Hypertension is classified as either primary (essential) hypertension or secondary hypertension. About 90–95% of cases are primary, defined as high blood pressure due to nonspecific lifestyle and genetic factors.[5,6] Lifestyle factors that increase the risk include excess salt, excess body weight, smoking, and alcohol. The remaining 5–10% of cases are categorized as secondary hypertension, defined as high blood pressure

due to an identifiable cause, such as chronic kidney disease, narrowing of the renal arteries, and endocrine disorder or the use of birth control pills etc.[5}

The assessment of the rise in BP associated with the doctor's visit obtained by means of intra-arterial recordingsis unsuitable, for ethical and technical reasons, for routine use either in a clinic setting or in human research.[7]

An alternative method based on use of new, devices for non-invasive, continuous, finger BP monitoring is also inapplicable on a large scale for economic reasons. This has spurred the development of "surrogate" solutions to the quantification of this phenomenon which might be more easily applied not only in research, but also in a clinic setting.[8]

The introduction of non- invasive, automated BP monitoring devices able to provide BP values out of the doctor's office has made the research of these surrogate solutions easier. This is because automated BP measurements do not trigger any alerting reaction and pressure rise comparable to that induced by a physician's visit. [9]

Lack of any change in intra-arterial BP before, during, and after automatic and semiautomatic arm cuff BP readings, emphasizing that the White coat effect is not due to arm cuff inflation, but to the presence of a physician performing the measurement. Based on this evidence, the difference between office and average daytime ambulatory or home BP values obtained by automated measurements has been proposed as an indirect assessment of the White coat effect. [10]

High blood pressure (BP) is the foremost modifiable risk factor for cardiovascular morbidity and mortality on a population basis. Accurate BP measurement is necessary for the assessment of BP-related cardiovascular risk. However, traditional office methods to assess BP control may provide an inaccurate assessment of underlying BP.A potential alternative to office BP is “automated office BP” (AOBP), which involves repeated, unobserved measures using an automated BP device with the patient resting quietly alone or in the waiting room. AOBP returns BP values that are consistently lower than conventional office BPand more closely correlated with daytime ambulatory BP (ABP) when compared with office BP.AOBP values are associated with cardiovascular outcomesand the

protocol is now recommended by some international hypertension guidelines. [11]

There is no perfect method for measuring BP to diagnose hypertension. Under different circumstances, different techniques will produce different readings. One factor which can affect BP readings is the extent of human involvement. [12]The 24-hour ambulatory BP, which involves the least involvement of patients or medical staff, is now considered to be the gold standard for evaluating an individual's BP status, since there is more evidence favoring ABPM(Ambulatory BP Moniter) as the best predictor of future cardiovascular events than any other BP measurement technique. There is now general agreement that patients being evaluated for possible hypertension should undergo 24-hour ABPM, whenever feasible. As with ABPM, the AOBP involves less human involvement in recording BP than do the other methods of recording BP in the office. The mercury sphygmomanometer is in the process of being eliminated because of environmental concerns, whereas aneroid devices continue to be used, despite concerns about their accuracy due to infrequent recalibration. Given that manual office BP is about 10/6 mm Hg higher than a 'guidelines quality' manual BP recorded in research studies[13]

There are 3 basic requirements for AOBP readings. BP must be recorded with a fully automated, electronic sphygmomanometer which takes multiple readings with the patient resting alone and undisturbed in a quiet place. Initially, AOBP recordings were taken with patients being alone in an examining room. However, subsequent research showed that valid AOBP readings could be taken in an office waiting room or in a community pharmacy, provided that the patient is sitting alone, resting quietly and is not disturbed.[14]

AOBP has a number of advantages over conventional manual office BP measurement. AOBP is not subject to the white coat effect and provides more accurate and standardized readings. Mean manual BP recorded in routine clinical practice averages 16/7 mm Hg higher than the mean AOBP, with the latter being similar to the awake ambulatory and home BP.[15] Overall, the improved accuracy of AOBP over manual BP is due to limited

involvement of the human factor in the measurement process and the use of multiple BP readings.[16]

This study was done on 200 OPD patients from the Department of Medicine and Department of Cardiology, of Dayanand Medical College & Hospital, Ludhiana with hypertension on treatment and normotensive at the time of screening to study the difference in measured blood pressure between home setting and office setting.

AIMS AND OBJECTIVES

1. To study the difference in measured blood pressure between home setting and office setting

REVIEW OF LITERATURE

Myers et al in 1997 found that blood pressure (BP) readings in the doctor's office are frequently higher than home or ambulatory values. This study examines the role of the physician in the aetiology of the 'white coat' effect, by comparing standard readings taken by the family physician of 27 treated hypertensive patients with readings taken by an automated BP recording device, with the patient alone in the examining room during the same office visit. The physician and automated readings were each compared to the mean awake ambulatory BP. Mean routine office BP (mm Hg) recorded by the patient's physician (155+/-4/80+/-2) was similar to the mean value obtained using the automated BP recording device (157+/-3/83+/-2). The mean awake ambulatory BP was 145+/-3/78+/-2 with the systolic value lower ($P < 0.05$) than either the physician or automated reading. Self-measurement of BP by the patient in the office setting does not reduce the magnitude of the white coat effect.[17]

Myers et al done a study to compare blood pressure measurements taken in routine clinical practice using an automated recorder, the BpTRU (VSM MedTech Ltd, Coquitlam, Canada), with readings taken by a conventional mercury sphygmomanometer. Fifty consecutive patients [28 women, 22 men; mean (+/-SD) age 62+/-16 years] referred to a specialist for management of hypertension had blood pressure taken on the first visit in random order using both a mercury sphygmomanometer and an automated device. The mean initial automated reading (mmHg) taken with the observer present (162+/-27/85+/-12) was similar to the mean manual blood pressure taken in duplicate (163+/-23/86+12). Both values were higher ($P<0.001$) than the mean of the next five readings taken with the automated recorder when the patient was resting quietly alone (142+/-21/80+/-12). Women exhibited a greater fall in blood pressure with the automated device than men.Use of an automated blood pressure recorder can eliminate some of the white-coat effect associated with readings taken by a mercury sphygmomanometer.[18]

Myers et al in their used an automated sphygmomanometer, the BpTRU, for blood pressure (BP) survey of 2,551 residents in the province of Ontario. Automated BP readings were compared with measurements taken

by amercury sphygmomanometer under standardized conditions in a random 10% sample.BP was recorded in 238 individuals in random order using both a standard mercury device and an automated BP recorder, the BpTRU. All subjects rested for 5 min prior to the first BP reading, which was then discarded. The mean of the next three readings was obtained using the mercury device whereas the BpTRU was set to record a mean of five readings taken at 1 min intervals with subjects resting alone in a quiet room.The mean s.d. BP with the automated device was 115 +/- 16/71 +/- 10 mm Hg compared to 118 +/- 16/74 +/- 10 mm Hg for the manual BP (P < 0.001). A systolic BP > or = 140 mm Hg was present for 16 automated and 19 manual readings. Similarly, the diastolic BP was > or = 90 mm Hg for 9 automated and 14 manual readings. Linear regression analysis showed that automated BP was a significant (P < 0.001) predictor of both manual systolic and diastolic BP. Conventional manual BP readings can be replaced by readings taken using a validated, automated BP recorder in population surveys. The slightly lower readings obtained with the BpTRU device (in the context of reduced observer-subject interaction) may be a more accurate estimate of BP status.[19]

Myers et al studied that during the past 15 years, clinical outcome studies have consistently reported that home and 24-hour ambulatory blood pressure recordings provide a significantly better measure of cardiovascular risk than do manual blood pressure readings taken in the office or clinic. The advent of automated sphygmomanometers that record blood pressure with the patient alone in the examining room will be the next major change in our approach to recording blood pressure. These automated devices virtually eliminate the white coat response and their readings correlate significantly better with the ambulatory blood pressure compared with manual office blood pressure readings. The principal finding from recent research into automated blood pressure measurement is that the presence of an observer during the actual reading in itself provokes the white coat response. [20]

Andreadis et al in 2011 told in their article that automated office blood pressure (AOBP) measurement with the patient resting alone in a quiet examining room can eliminate the white-coat effect associated with

conventional readings taken by manual sphygmomanometer. The key to reducing the white-coat response appears to be multiple blood pressure (BP) readings taken in a non-observer office setting, thus eliminating any interaction that could provoke an office-induced increase in BP. Furthermore, AOBP readings have shown a higher correlation with the mean awake ambulatory BP compared with BP readings recorded in routine clinical practice. Although there is a paucity of studies connecting AOBP with organ damage, AOBP values were recently found to be equally associated with left ventricular mass index as those of ambulatory BP. This concludes that in contrast to routine manual office BP, AOBP readings compare favourably with 24-hour ambulatory BP measurements in the appraisal of cardiac remodelling and, as such, could be complementary to ambulatory readings in a way similar to home BP measurements.[21]

Andreadis et al in 2011 found that Automated office blood pressure (AOBP) measurement with the patient resting alone in a quiet examining room can eliminate the white-coat effect associated with conventional readings taken by manual sphygmomanometer. The key to reducing the white-coat response appears to be multiple blood pressure (BP) readings taken in a non-observer office setting, thus eliminating any interaction that could provoke an office-induced increase in BP. Furthermore, AOBP readings have shown a higher correlation with the mean awake ambulatory BP compared with BP readings recorded in routine clinical practice. Although there is a paucity of studies connecting AOBP with organ damage, AOBP values were recently found to be equally associated with left ventricular mass index as those of ambulatory BP. This concludes that in contrast to routine manual office BP, AOBP readings compare favourably with 24-hour ambulatory BP measurements in the appraisal of cardiac remodelling and, as such, could be complementary to ambulatory readings in a way similar to home BP measurements. [22]

Andreadis et al in 2012had done a study to compare the quality and accuracy of morning blood pressure (BP) readings as taken by automated office BP (AOBP) and morning home BP (mHBP) techniques using morning ambulatory BP (mABP) measurements as the gold standard.A total of 139 individuals were included, 70 men and 69 women, mean age 53±13 years.

The average AOBP readings as measured using a Microlife Watch BP office device taking triplicate automated simultaneous readings of both arms were compared with mHBP monitored on 6 routine days, using a validated automated electronic device. Both modalities were also compared with the ambulatory readings of the 3 h of waking (mABP3h).The AOBP values were slightly higher than the mABP3h (mean difference 8.2 mmHg, 95% limits of agreement, -18.8 to 35.2 mmHg for the systolic BP and mean difference 4.3 mmHg, 95% limits of agreement, -15.3 to 23.9 mmHg for the diastolic BP). Systolic and diastolic AOBP readings correlated with mABP3h (r=0.66, P=0.001 and r=0.64, P=0.001, respectively). Agreement was fair between AOBP and mHBP in the detection of morning hypertensive patients (agreement 70%, κ=0.32) as compared with AOBP and mABP3h (agreement 67%, κ=0.32) and mHBP and mABP3h (agreement 65%, κ=0.31).The AOBP technique could replace mHBP monitoring in the assessment of morning BP, as it provides comparable data in relation to the awake ambulatory BP. Given the simplicity of this method, it could be more readily applied in a larger number of individuals.[23]

Myers et al in 2012 suggested that Manual blood pressure (BP) is gradually disappearing from clinical practice with the mercury sphygmomanometer now considered to be an environmental hazard. Manual BP is also subject to measurement error on the part of the physician/nurse and patient-related anxiety which can result in poor quality BP measurements and office-induced (white coat) hypertension. Automated office (AO) BP with devices such as the BpTRU (BpTRU Medical Devices, Coquitlam, BC) has already replaced conventional manual BP in many primary care practices in Canada and has also attracted interest in other countries where research studies using AOBP have been undertaken. The basic principles of AOBP include multiple readings taken with a fully automated recorder with the patient resting alone in a quiet room. When these principles are followed, office-induced hypertension is eliminated and AOBP exhibits a much stronger correlation with the awake ambulatory BP as compared with routine manual BP measurements. Unlike routine manual BP, AOBP correlates as well with left ventricular mass as does the awake ambulatory

BP. AOBP also simplifies the definition of hypertension in that the cut point for a normal AOBP (< 135/85 mm Hg) is the same as for the awake ambulatory BP and home BP. This article summarizes the currently available evidence supporting the use of AOBP in routine clinical practice and proposes an algorithm in which AOBP replaces manual BP for the diagnosis and management of hypertension.[24]

Myers et al in 2012 did a study and found that effective strategies to identify office-induced hypertension in routine clinical practice are required to improve diagnosis and management of hypertension. To compare the quality and accuracy of automated office blood pressure (AOBP) measurement using the BpTRU device with manual office blood pressure (MOBP) in routine clinical practice using awake ambulatory blood pressure (AABP) as the gold standard.Primary care practices in Eastern Canada were allocated by cluster randomization to use of AOBP (36 practices, 52 physicians) or to MOBP (31 practices, 36 physicians) in patients with systolic hypertension. The last routine MOBP reading pre-enrolment was compared to the blood pressure (BP) at the first visit after enrollment and after 2 years of follow-up. The primary outcome measure was the mean difference between the AABP and MOBP versus AOBP. The mean (95% confidence interval) decrease in systolic BP from pre- to post-enrollment was greater (P < 0.001) at the first visit in the 252 AOBP patients [-14.3 (-16.6, -12.0)] compared to the 209 MOBP patients [-8.0 (-2.2, -5.8)]. At Year 2, AOBP decreased by -16.3 (-18.6, -14.1) compared to a decrease in MOBP of -12.4 (-14.7, -10.1) (P = 0.02). The mean difference between systolic AABP and MOBP at the first post-enrollment office visit [-7.3 (-9.7, -4.9)] was greater (P < 0.001) than the difference for AOBP [-1.8 (-4.0, 0.4)]. At Year 2, these differences were -5.2 (-7.5, -3.0) for MOBP and -2.8 (-4.9, -0.7) for AOBP (P = 0.13).AOBP virtually eliminated office-induced hypertension. The decrease in MOBP was attributed to participation in a research study and not to any specific intervention.[25]

Myers et al in 2012 suggested that clinical practice guidelines have traditionally recommended manual blood pressure (BP) measurement in the office setting as the standard method for diagnosing hypertension. In reality, manual BP in routine clinical practice is relatively inaccurate, over-

diagnoses hypertension by provoking office-induced increases in BP and correlates poorly with both the awake ambulatory BP and target organ damage. The most recent guidelines recommend 24-h ambulatory BP and home BP for diagnosing hypertension. The advent of automated office BP (AOBP) represents a third alternative to conventional manual BP measurement, one that maintains the role of office BP readings in the diagnosis and management of hypertension. AOBP has three basic principles: multiple readings taken using a fully automated sphygmomanometer with the patient resting quietly alone. AOBP eliminates office-induced hypertension such that the cut-point for a normal AOBP is the same as for the awake ambulatory BP and home BP. As compared to routine manual office BP, AOBP provides more accurate BP readings, is more consistent during repeated office visits and in different settings and correlates better with both the awake ambulatory BP and target organ damage. The advantages of AOBP over manual BP measurement support its use in routine clinical practice.[26]

Padwal et al conducted a study to compare serial readings from an in-pharmacy automated blood pressure (BP) kiosk to mean daytime ambulatory BP. A total of 100 community-dwelling adults with hypertension underwent (1) three baseline automated office readings; (2) three in-pharmacy readings on each of four visits (12 total) using the PharmaSmart PS-2000 kiosk; and (3) 24-hour ambulatory BP monitoring between in-pharmacy visits two and three. Paired t-tests, Bland-Altman plots, and Pearson correlation coefficients were used for analysis. Mean BPs were 137.8 ± 13.7/81.9 ± 12.2 mm Hg for in-pharmacy and 135.5 ± 11.7/79. 7 ± 10.0 mm Hg for day time ambulatory (difference of 2.3 ± 9.5/2.2 ± 6.9 mm Hg [P ≤ .05]). Bland-Altman plots depicted a high degree of BP variability but did not show clinically important systematic BP differences. With ambulatory BP as the reference standard, in-pharmacy device results were similar to automated office results. The PharmaSmart PS-2000 closely approximated mean daytime ambulatory BP, supporting the use of serial readings from this device in the assessment of BP.[27]

Filipovský et al studied the relationships of automated blood pressure (BP), measured in the healthcare centre, with manual office BP and home BP. Stable outpatients treated for hypertension were measured automatically, seated alone in a quiet room, six times after a 5 min rest with the BpTRU device, and immediately afterwards using the auscultatory method. Home BP was measured in a subgroup during 7 days preceding the visit. The automated, office and home BP values were 131.2 ± 21.8/77.8 ± 12.1 mmHg, 146.9 ± 20.8/85.8 ± 12.4 mmHg and 137.7 ± 17.7/79.4 ± 8.2 mmHg, respectively. Limits of agreement between office and automated BP (2 SDs in Bland-Altman plots) were +42.6 to -12.6/+22.6 to -6.6 mmHg for systolic/diastolic BP; for home and automated BP they were +45.8 to -25.8/+20.8 to -12.6 mmHg. For patients with two visits, intraclass correlation coefficients of BP values measured during the first and second visits were 0.66/0.72 for systolic/diastolic automated BP and 0.68/0.74 for systolic/diastolic office BP. Automated BP was lower than home BP and no more closely related to home BP than to office BP. It did not show better repeatability than office BP. Whether automated BP and the "white-coat effect", calculated case the office BP-automated BP difference, have clinical and prognostic importance deserves further studies.[28]

Wohlfahrt et al studied that Manual SBP (mean difference 6.39 ± 9.76 mmHg) and DBP (mean difference 2.50 ± 6.54 mmHg) were higher than the automated BP. According to polynomial regression, automated systole of 131.06 (95% confidence interval 130.43-131.70) and diastole of 85.43 (95% confidence interval 85.03-85.82) corresponded to the manual BP of 140/90 mmHg. Using this cut-off, the white-coat hypertension was present in 24% of participants with elevated manual BP, whereas 10% had masked hypertension and 11% masked uncontrolled hypertension. In individuals with masked uncontrolled hypertension, only AOBP was associated with the urinary albumin-creatinine ratio, whereas there was no association with manual BP. So AOBP of 131/85 mmHg corresponds to the manual BP of 140/90 mmHg. This value may be used as a threshold for diagnosing hypertension using AOBP. However, outcome-driven studies are required to confirm this threshold.[29]

Vischer et al told that Blood pressure measurement has a long history and a crucial role in clinical medicine. Manual measurement using a mercury sphygmomanometer and a stethoscope remains the Gold Standard. However, this technique is technically demanding and commonly leads to faulty values. Automatic devices have helped to improve and simplify the technical aspects, but a standardised procedure of obtaining comparable measurements remains problematic and may therefore limit their validity in clinical practice. This underlines the importance of less error-prone measurement methods such as ambulatory or home blood pressure measurements and automated office blood pressure measurements. These techniques may help to uncover patients with otherwise unrecognised or overestimated arterial hypertension. Additionally these techniques may yield a better prognostic value.[30]

Andreadis et al did a study and found that automated office blood pressure (AOBP) has recently been shown to closely predict cardiovascular (CV) events in the elderly. Home blood pressure (HBP) has also been accepted as a valuable method in the prediction of CV disease. This study aimed to compare conventional office BP (OBP), HBP, and AOBP in order to evaluate their value in predicting CV events and deaths in hypertensives. We assessed 236 initially treatment naïve hypertensives, examined between 2009 and 2013. The end points were any CV and non-CV event including mortality, myocardial infarction, coronary heart disease, hospitalization for heart failure, severe arrhythmia, stroke, and intermittent claudication. We fitted proportional hazards models using the different modalities as predictors and evaluated their predictive performance using three metrics: time-dependent receiver operating characteristics curves, the Akaike's Information Criterion, and Harrell's C-index. After a mean follow-up of 7 years, 23 participants (39% women) had experienced 1 CV event. Conventional office systolic (hazard ratio [HR] per 1 mm Hg increase in BP, 1.028; 95% confidence interval [CI], 1.009-1.048), automated office systolic (HR per 1 mm Hg increase in BP, 1.031; 95% CI, 1.008-1.054), and home systolic (HR, 1.025; 95% CI, 1.003-1.047) were predictive of CV events. All systolic BP measurements were predictive after adjustment for other CV risk factors ($P < .05$). The predictive performance of the different modalities

was similar. Conventional OBP was significantly higher than AOBP and average HBP. AOBP predicts equally well to OBP and HBP CV events. It appears to be comparable to HBP in the assessment of CV risk, and therefore, its introduction into guidelines and clinical practice as the reference method for assessing BP in the office seems reasonable after verification of these findings by randomized trials.[31]

Refrit et al did a study in which two hundred eighty-eight patients were included in the clinical cohort, and 195 patients contributed to research-grade BP data. All patients had hypertension. AOBP averages were lower than manual measurement averages in both clinical (-3.6 ± 14.9 mm Hg / -3.0 ± 8.8 mm Hg) and research (-2.7 ± 10.0 / -2.4 ± 6.3 mm Hg) environments. The gap between measurement methods did not differ between research and clinical data. Cohen kappa coefficient was lower in the clinical context because of greater variability and more time between BP measurements (5.5 ± 2.9 months).Manual BP readings were slightly higher than AOBP estimates. The difference was not influenced by the real-world context of clinical practice. Office nonautomated BP measurements may still be valuable if measurement procedures are well standardized and performed by trained nurses.[32]

Moore et al studied that Automated office blood pressure (AOBP) involving repeated, unobserved blood pressure (BP) readings during one clinic visit is recommended for in-office diagnosis and assessment of hypertension. However, the optimal AOBP protocol to determine BP control in the least amount of time with the fewest BP readings is yet to be determined and was the aim of this study.One hundred and eighty-nine patients (mean age 62.8 ± 12.1 years; 50.3% female) with treated hypertension referred to specialist clinics at 2 sites underwent AOBP in a quiet room alone. Eight BP measurements were taken starting immediately after sitting and then at 2-minute intervals (15 minutes total). The optimal AOBP protocol was defined by the smallest mean difference and highest intraclass correlation coefficient (ICC) compared with daytime ambulatory BP (ABP). The same BP device (Mobil-o-graph, IEM) was used for both AOBP and daytime ABP.Average 15-minute AOBP and daytime ABP were 134 ± 22/82 ± 13 and 137 ± 17/83 ± 11 mm Hg, respectively. The optimal AOBP protocol was

derived within a total duration of 6 minutes from the average of 2 measures started after 2 and 4 minutes of seated rest (systolic BP: mean difference (95% confidence interval) 0.004(-2.21, 2.21) mm Hg, P = 1.0; ICC = 0.81; diastolic BP: mean difference 0.37(-0.90, 1.63) mm Hg, P = 0.57; ICC = 0.86). AOBP measures taken after 8 minutes tended to underestimate daytime ABP (whether as a single BP or the average of more than 1 BP reading).Only 2 AOBP readings taken over 6 minutes (excluding an initial reading immediately after sitting) may be needed to be comparable with daytime ABP.[33]

Myers et al in 2018 suggested that Measurement of blood pressure (BP) using the auscultatory method must follow specific rules and conditions to be reliable. Nonetheless, these requirements are often not followed in clinical practice, resulting in inaccurate BP readings. Simply replacing manual sphygmomanometers with an oscillometric device may still produce readings that are associated with a white coat effect. These limitations can be overcome by using an oscillometric sphygmomanometer that automatically records multiple readings with the patient resting quietly and alone, called automated office (AO)BP. AOBP produces office readings with a reduced white coat effect, which are also similar to the awake ambulatory BP. There is also evidence that AOBP is a better predictor of target organ damage than attended office BP. Furthermore, clinical outcome data support AOBP as having both a similar diagnostic threshold as awake ambulatory BP and a lower treatment target. Using AOBP in clinical practice simplifies recording office BP by not requiring an additional period of rest before activation of the device and by not having staff present during the actual measurements. Recent studies have reported that automatic BP measurements taken by staff in research studies with close adherence to guidelines using AOBP devices may produce similar readings to AOBP. Further research is needed to determine the best method for recording BP at systolic targets < 130 mm Hg and the relationship of office BP to ambulatory BP and home BP. [34]

Filipovský et al analysed data on 172 subjects aged 63.7 ± 12.4 years with AuscOBP 127.6 ± 12.1/77.6 ± 10.0 mm Hg are reported. Auto BP was by 8.5 ± 9.0/3.0 ± 6.1 mm Hg lower than Ausc OBP. The AuscOBP-u Auto OBP

difference increased with the AuscOBP level and it did not depend on any other factor. OscOBP differed by 8.6 ± 8.6/1.9 ± 5.7 mm Hg from uAutoOBP. 24-hour mean BP was by 4.2 ± 12.1/3.5 ± 7.8 mm Hg lower than AuscOBP and by 4.3 ± 11.0/0.5 ± 6.9 mm Hg higher than uAutoOBP; the correlation coefficients of 24-hour mean BP with AuscOBP and with uAutoOBP did not differ (p for difference ≥.13). In the lowest BP group (systolic AuscOBP <120 mm Hg or diastolic AuscOBP <70 mm Hg), both AuscOBP and uAutoOBP were lower than 24-hour mean BP, while in the highest BP group (systolic AuscOBP ≥140 mm Hg or diastolic AuscOBP ≥90 mm Hg), they were higher.Compared to uAutoOBP, attended BP measurement gives higher values, both when measured with auscultatory or oscillometric method. Inter-individual variability of AutoOBP - uAuscOBP difference, as well of uAutoOBP - ABPM difference, is large. We did not prove that uAutoOBP would be associated to 24-hour ambulatory BP more closely than attended BP[35]

Roerecke et al in 2019 found that automated office blood pressure (AOBP) measurement involves recording several blood pressure (BP) readings using a fully automated oscillometric sphygmomanometer with the patient resting alone in a quiet place. Although several studies have shown AOBP measurement to be more accurate than routine office BP measurement and not subject to a "white coat effect," the cumulative evidence has not yet been systematically reviewed.To perform a systematic review and meta-analysis to examine the association between AOBP and office BP readings measured in routine clinical practice and in research studies, and ambulatory BP recorded during awake hours, as the latter is a standard for predicting future cardiovascular events. The medline, Embase, and Cochrane Library were searched from 2003 to April 25, 2018.Studies on systolic and diastolic BP measurement by AOBP in comparison with awake ambulatory BP, routine office BP, and research BP measurements were included if they contained 30 patients or more. Study characteristics were abstracted independently and random effects meta-analyses and meta-regressions were conducted. Pooled mean differences (95% CI) of systolic and diastolic BP between types of BP measurement. Data were compiled from 31 articles comprising 9279 participants (4736 men and 4543 women).

In samples with systolic AOBP of 130 mm Hg or more, routine office and research systolic BP readings were substantially higher than AOBP readings, with a pooled mean difference of 14.5 mm Hg (95% CI, 11.8-17.2 mm Hg; n = 9; I2 = 94.3%; P < .001) for routine office systolic BP readings and 7.0 mm Hg (95% CI, 4.9-9.1 mm Hg; n = 9; I2 = 85.7%; P < .001) for research systolic BP readings. Systolic awake ambulatory BP and AOBP readings were similar, with a pooled mean difference of 0.3 mm Hg (95% CI, -1.1 to 1.7 mm Hg; n = 19; I2 = 90%; P < .001).Automated office blood pressure readings, only when recorded properly with the patient sitting alone in a quiet place, are more accurate than office BP readings in routine clinical practice and are similar to awake ambulatory BP readings, with mean AOBP being devoid of any white coat effect. There has been some reluctance among physicians to adopt this technique because of uncertainty about its advantages compared with more traditional methods of recording BP during an office visit. Based on the evidence, AOBP should now be the preferred method for recording BP in routine clinical practice.[36]

D'Sa et al told that blood pressure (BP) measured in the clinic is subject to the white coat effect and does not always indicate the 'usual' BP. Ambulatory BP is the current gold standard, but remains inconvenient for routine use. Interest in automated BP, where the healthcare professional is absent from the examination room during BP measurement, is growing, as this reduces the white coat effect and yields BP values that are close to ambulatory readings. The aim of this study was to investigate how well automated office BP (AOBP), measured using the Omron HEM-907 device, compares with observed office BP (OOBP, healthcare professional remains in the examination room) and awake ambulatory BP (AABP) measurements. OOBP, AOBP and AABP were measured in 108 participants, with OOBP and AOBP measurements repeated 1 week later, following a standardised protocol. Average BP readings for visit one were 134 ± 18/77 ± 11 for OOBP, 131 ± 16/75 ± 11 for AOBP, and 133 ± 15/82 ± 12 for AABP. On both visits, automated readings were significantly lower than observed readings for both systolic and diastolic BP (P < 0.001 for both). Automated readings were also significantly lower than ambulatory readings, with a mean difference in systolic/diastolic BP of -

2 ± 11/- 7 ± 10 ($P < 0.001$ for both), with high correlations between the two modalities ($r = 0.75$ and $r = 0.64$, for systolic and diastolic BP, respectively, $P < 0.001$ for both). AOBP measured by the Omron HEM-907 is not associated with a white coat effect, unlike observed readings, and provides reproducible results and good correlations with ambulatory readings. Automated BP measured using the Omron HEM-907 is, therefore, a useful alternative to observed office readings.[37]

MATERIAL & METHODS

200 OPD person normotensive or hypertension stage 1 and hypertensive stage 2 and3 those are stable on treatment since one month included in the study. The particulars of the participants recorded in a Performa sheet.

First blood pressure recordings done by the participants by using a scillometric (digital)BP apparatus that is Watch BP home A (Microlife) at home.

Each recruited participants provided a BP apparatus that is Watch BP home A (Microlife) for 3 days. Participant educated on how to take blood pressure recordings. Participants instructed to take blood pressure readings 2 times each day (with instructions to take the BP recordings at the same time each day) for 3 consecutive days. Participants educated to avoid tea, coffee, alcohol, drugs and cigarettes 30 minutes prior to taking a blood pressure reading, making sure to rest for 5 minutes prior to taking BP measurement; resting their arm on a table with their arm supported at the level of their heart; and instructions on how to place the blood pressure cuff on their right arm. Participants directed to write down the measurements recorded by blood pressure machine in the Performa sheet, and blood pressure readings also stored digitally in Watch BP home A (Microlife) apparatus memory.

On the 4th day, participants come to the office on one of the times they were taking their home blood pressure readings. Home readings are collected from digital memory of Watch BP home A (Microlife) and average of these home readings included in study.

In office two readings taken with digital BP apparatus (Watch BP home A, Microlife) apparatus that is used by participants at home and average of two readings included in study.

In office two manual blood pressure readings were taken by clinician with aneroid B.P apparatus and average of these two readings included in study.

After taking the blood pressure reading by the clinician, blood pressure reading taken with Automated Blood Presure Monitor (Microlife WatchBP Office) in absence of observer, three reading taken by monitor(5 minute of reset ,3 readings with 1 minute interval taken) and than an average final reading considered in study. All the data recorded on a Performa sheet.

Inclusion criteria

- Person normotensive or hypertensive stage-1.
- Participants with hypertension stage 2 and 3 those on treatment remains stable for last 1 month included in study

Exclusion criteria

- Participants who are not able to follow protocol instructions.
- Person with arrhythmias.
- Participants whose treatment modified within last 1 month
- **STATISTICAL ANALYSIS**
- Frequency distribution reported. Descriptive analysis done. Statistics reported as Mean ± SD and count as n (%). Student 't' test and chi square test used. p value ≤0.05 consider as significant. Data analysed using intercooled stat 9.2 statistical software.

OBSERVATIONS AND RESULTS

Gender wise distribution of participants

GENDER	No. of cases	Percentage
F-Female	64	32.0%
M- Male	136	68.0%
Total	200	100.0%

Table 1 - This table shows no of male and female participants .there is 64 female in study and 136male in study.

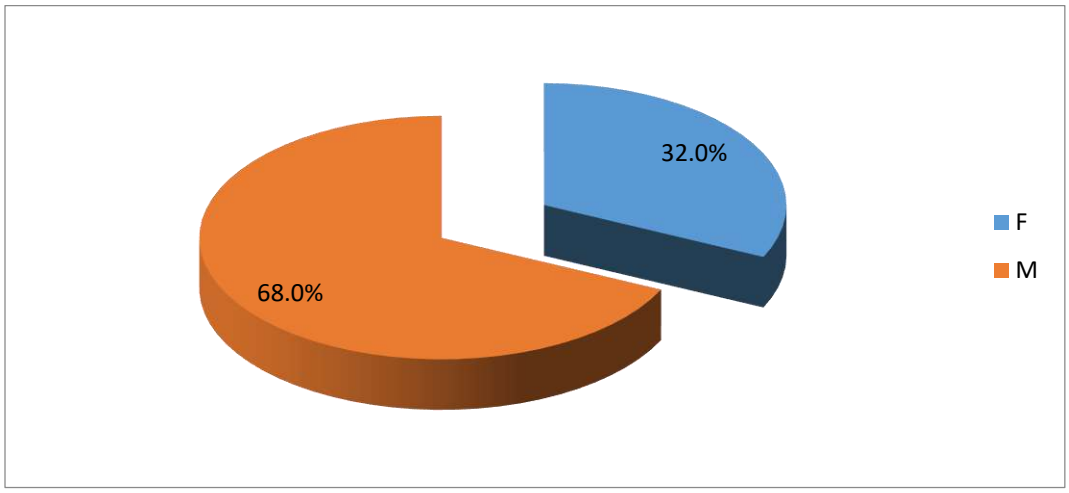

Figure 1 - Percentage wise distribution of male and female participants, 68% are male and 32% are female in this study.

Age Group Distribution of all participants in study

AGE GROUP	No. of cases	Percentage
20-30	58	29.0%
31-40	77	38.5%
41-50	38	19.0%
51-60	27	13.5%
Total	200	100.0%

Table 2- This table shows the age distribution of participants involve in this study. Age group between 20-30 years has 58 participants, between 31-40 years has 77 participants, between 41-50 years has 38 participants and between 51-60 years has 27 participants.

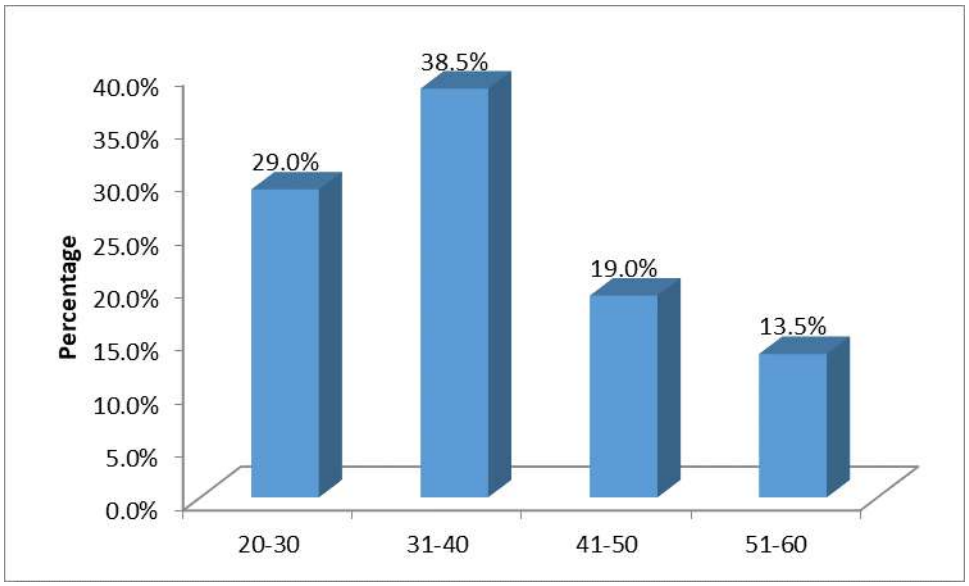

Figure 2 - This figure shows percentage of different age group of participants. It shows 38.5% participants has age between 31-40years, 29% has age 20-30 years .

Distribution of Hypertensive and non -hypertensive participants in study

HTN	No. of cases	Percentage
NO	157	78.5%
YES	43	21.5%
Total	200	100.0%

Table 3-This table shows that in this study 157 participants were non hypertensive and 43 was hypertensive.

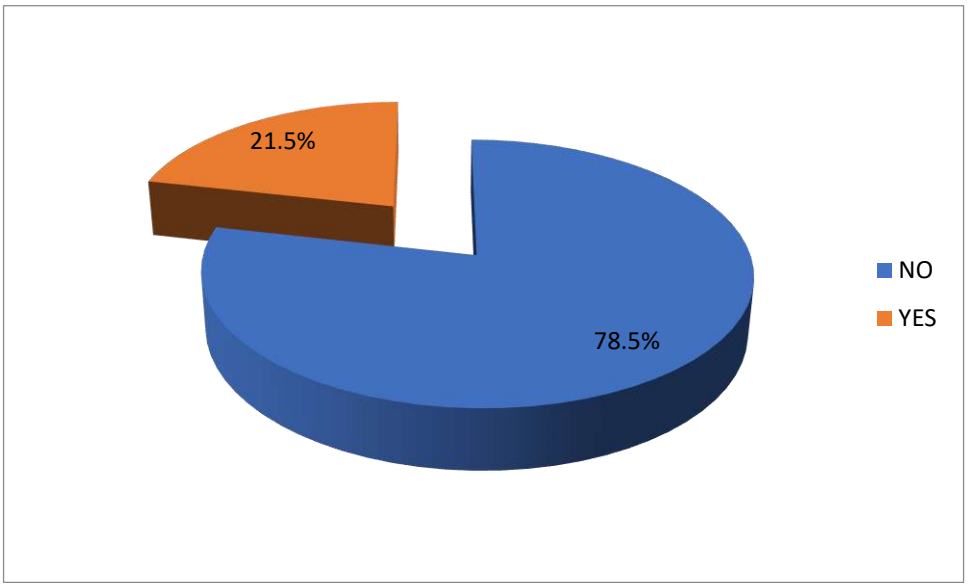

Figure 3- This figure shows the percent wise distribution of hypertensive and non-hypertensive participants in study.

A Comparison of Automated Office BP Apparatus (AOBP) with OABP (Office automatic BP readings on Watch BP home A (Microlife)) all participants

Comparison of SBP readings

AOBP-OABP	No. of cases	Percentage
D-decrease in reading on AOBP compare to OABP	152	76.0%
H- increase in reading on AOBP compare to OABP	44	22.0%
N-no change in BP readings	4	2.0%
Total	200	100.0%

Table 4- this table shows comparison of mean SBP readings on AOBP and OABP, the 152 participants decrease in SBP readings and in 44 has increase in readings when readings compares between AOBP and OABP.

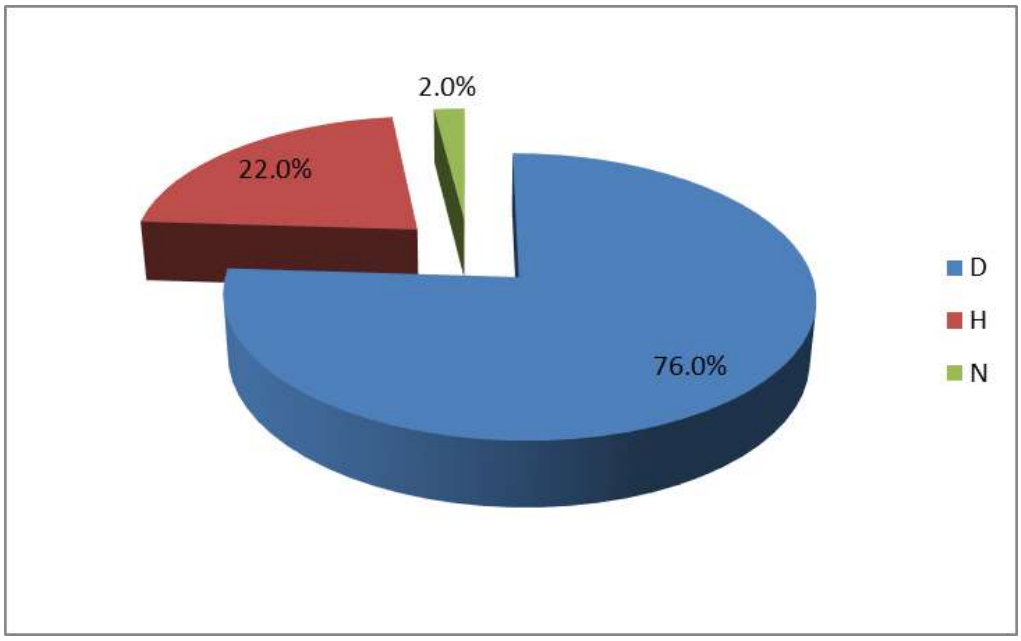

Figure 4 – This figure shoes percentage distribution of participants increase or decrease in SBP reading.

A Comparison of Automated Office BP Apparatus (AOBP) - with OABP (Office automatic BP readings on Watch BP home A (Microlife)) all participants

Calculation and comparison of SBP readings magnitude

AOBP-OABP SBP	No. of cases	Percentage
> -5	73	36.5%
< -5	79	39.5%
0	4	2.0%
<5	30	15.0%
>5	9	4.5%
>10	5	2.5%
Total	200	100.0%

Table 5- This table shows the magnitude of change of SBP readings of AOBP in comparison to OABP.

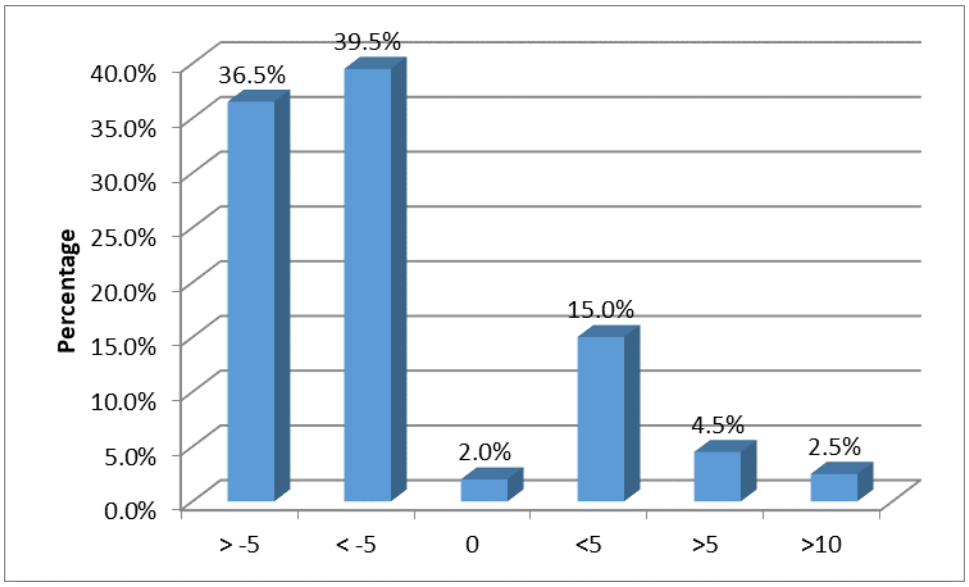

Figure 5 - This figure shows the percent wise magnitude of change of SBP readings of AOBP in comparison to OABP.

A Comparison of Automated Office BP Apparatus (AOBP) - with OABP (Office automatic BP readings on Watch BP home A (Microlife)) all participants

Comparison of DBP readings

AOBP-OABP DBP READINGS	No. of cases	Percentage
D- decrease in reading on AOBP compare to OABP	129	64.5%
H- increase in reading on AOBP compare to OABP	52	26.0%
N- no change in BP readings	19	9.5%
Total	200	100.0%

Table 6 - This table shows comparison of mean SBP readings on AOBP and OABP.

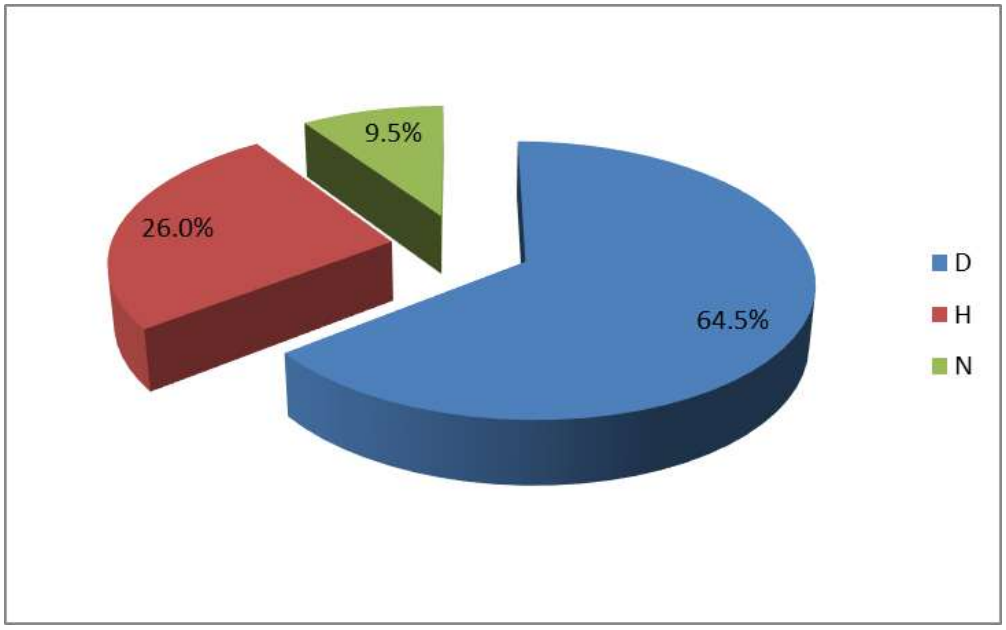

Figure 6 – This figure shows percentage wise distribution of participants for AOBP and OABP.

A Comparison of Automated Office BP Apparatus (AOBP) with OABP (Office automatic BP readings on Watch BP home A (Microlife)) all participants

Calculation and comparison of DBP readings magnitude

AOBP-OABP DBP READINGS	No. of cases	Percentage
> -5	34	17.0%
< -5	95	47.5%
0	19	9.5%
<+5	42	21.0%
5+10	7	3.5%
>+10	3	1.5%
Total	200	100.0%

Table 7 - This table shows the magnitude of change of DBP readings of AOBP in comparison of OABP.

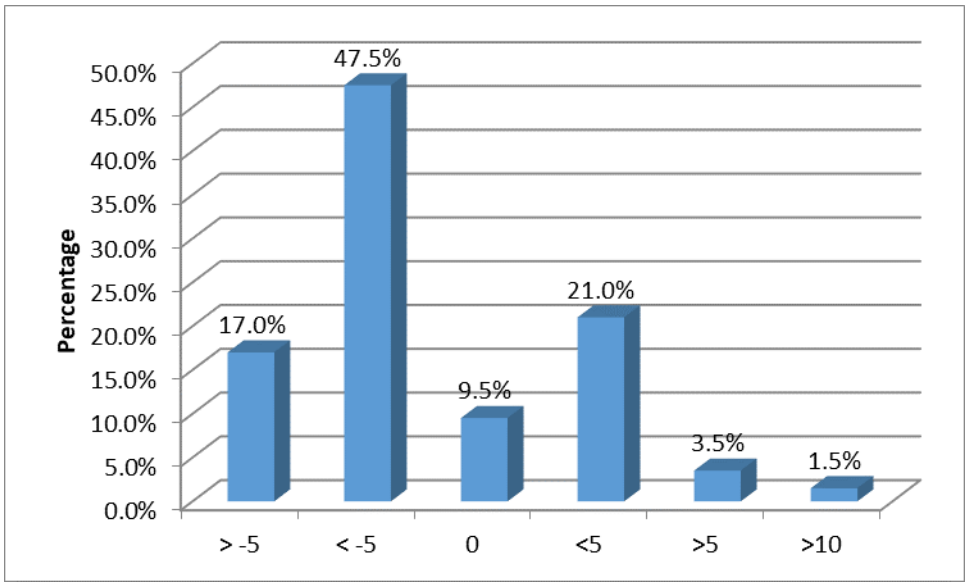

Figure 7- This figure shows the percent wise magnitude of change of SBP readings of AOBP in comparison of OABP.

A Comparison of Automated Office BP Apparatus (AOBP) - with OABP (Office automatic BP readings on Watch BP home A (Microlife)) all participants

Comparison of pulse readings

AOBP-OSCILLOMETRIC(DIGITAL) APPARATUS OFFICE PULSE READINGS	No. of cases	Percentage
D- decrease in reading on AOBP compare to OABP	113	56.5%
H- increase in reading on AOBP compare to OABP	70	35.0%
N- no change in readings	17	8.5%
Total	200	100.0%

Table 8 – This Table shows the 13 of participants decrease and 70 participants increase in pulse readings on AOBP compare to OABP.

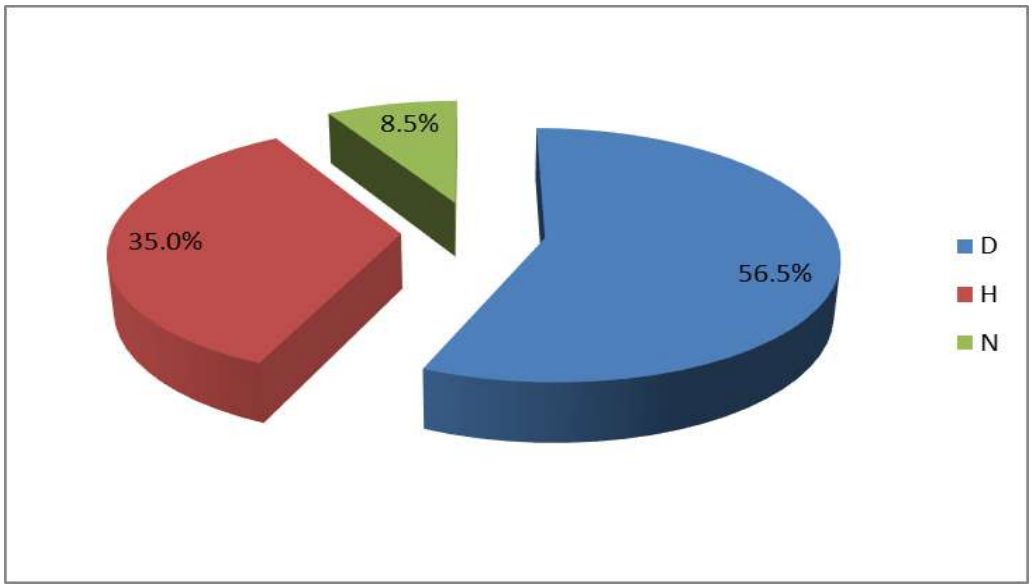

Figure 8 – This figure shows the 56.5% percentage of participants decrease in pulse 35% increase in pulse readings ,when readings taken on AOBP.

A Comparison of Automated Office BP Apparatus (AOBP) - with OABP (Office automatic BP readings on Watch BP home A (Microlife) in all participants

Calculation and comparison of magnitude of pulse

AOBP-OABP PULSE READINGS	No. of cases	Percentage
> -5	32	16.0%
< -5	82	41.0%
0	17	8.5%
<+5	51	25.5%
5+10	10	5.0%
>+10	8	4.0%
Total	200	100.0%

Table 9 - This table shows the magnitude of change of pulse readings of AOBP in comparison of OABP.

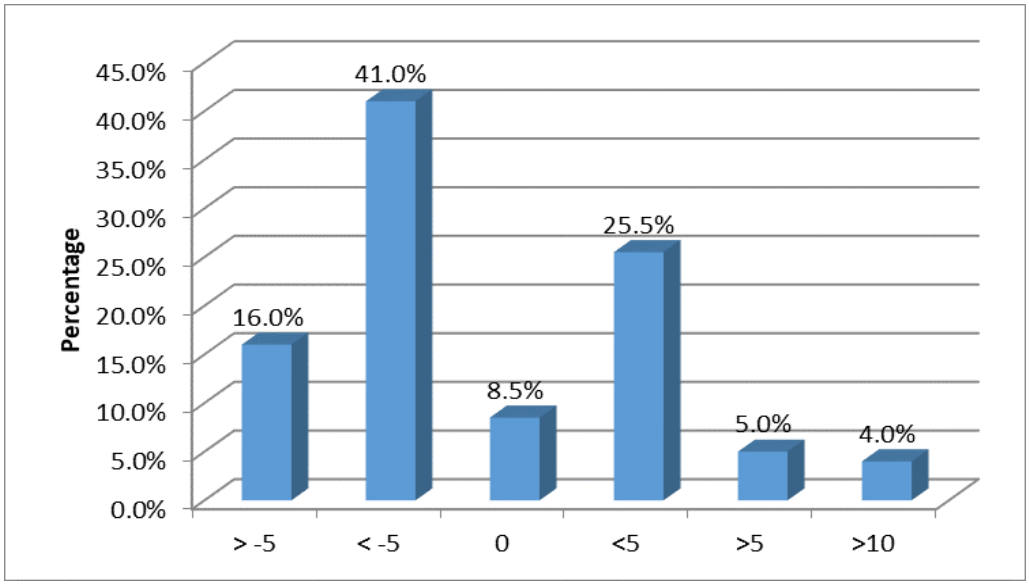

Figure 9 - This figure shows the magnitude of change of pulse readings of AOBP in comparison of OABP in office,

A Comparison of Automated Office BP Apparatus (AOBP) - with OABP (Office automatic BP readings on Watch BP home A (Microlife)) all participants

GENDER			HTN				Total	Chi-square value	p-value
			NO		YES				
F	AOBP-OABP SBP	D- decrease in reading on AOBP compare to OABP readings	39	79.6 %	7	46.7%	46	6.197	0.045
		H- increase in reading on AOBP compare to OABP readings	9	18.4 %	7	46.7%	16		
		N-no change in readings	1	2.0%	1	6.7%	2		
	Total		49	76.6 %	15	23.4%	64		
M	AOBP-OABP SBP	D -decrease in reading on AOBP compare to OABP	83	76.9 %	23	82.1%	106	0.527	0.768
		H-increase in reading on AOBP compare to OABP readings	23	21.3 %	5	17.9%	28		
		N-no change in readings	2	1.9%	0	0.0%	2		
	Total		108	79.4 %	28	20.6%	136		

Table 10– This table shows gender wise distribution of SBP readings in all participants and comparison between hypertensive and non hypertensive participants.

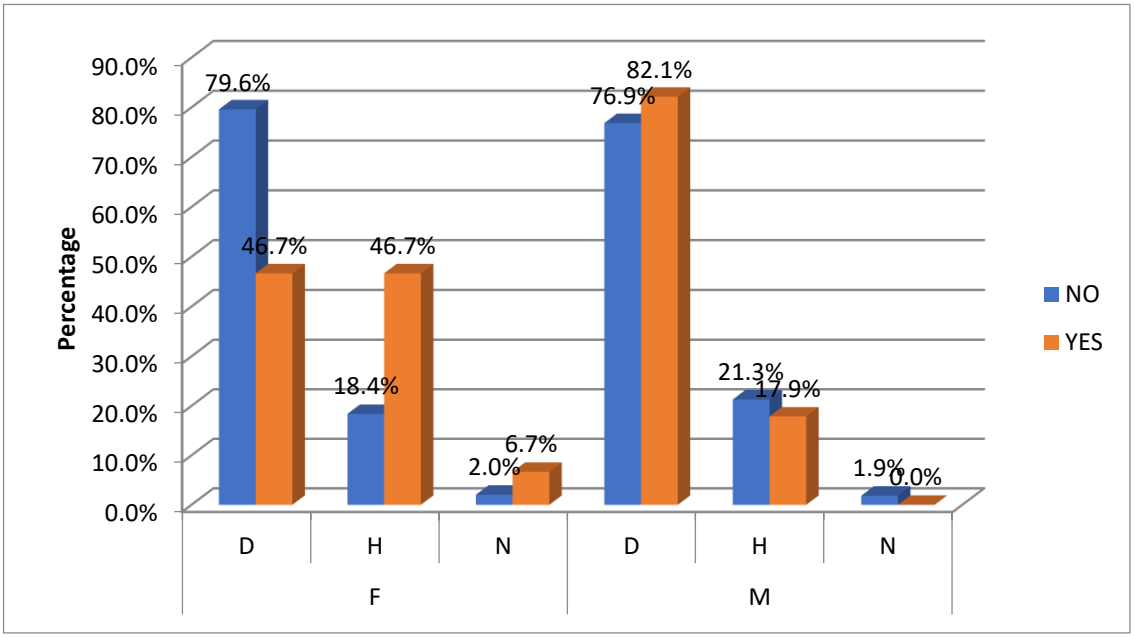

Figure 10 - This figure shows the percentage distribution male and female participants , hypertensive and non hypertensive participants and change of BP readings when Automated Office BP Apparatus(AOBP) compare with OABP for SBP readings

A Comparison of Automated Office BP Apparatus (AOBP) - with OABP (Office automatic BP readings on Watch BP home A (Microlife) in all participants

Comparison of mean SBP and DBP readings

	OABP BP		AOBP BP		Difference		t	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD	Mean	SD			Lower	Upper
SBP	130.10	11.44	126.53	12.02	3.57	6.51	7.772	0.000	2.67	4.48
DBP	80.94	7.93	77.86	8.24	3.08	6.52	6.680	0.000	2.17	3.99
Pulse	77.54	9.28	75.89	8.62	1.66	6.66	3.513	0.001	0.73	2.58

Table 11 - This table shows the comparison of mean of SBP and DBP readings for AOBP and OABP, there is 126.53mmhg and for OABP is 130.10mmhg ,difference in these two mean value is 3.57+_6.51(p<0.001)

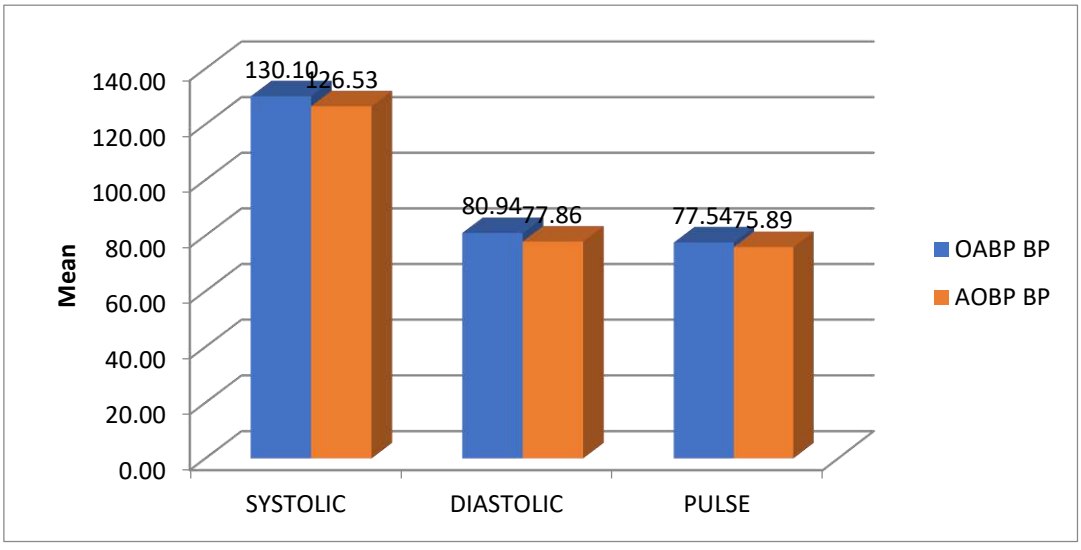

Figure 11- This figure shows the comparison of mean of SBP and DBP readings for AOBP and OABP.

(B) Comparison of average of office Manual BP readings (OMBP) taken with manual apparatus by observer With Automated Office BP apparatus (AOBP) BP readings in all participants

Comparison of SBP readings

MANUAL(ANEROID)-AOBP SBP READIGS	No. of cases	Percentage
D -decrease in reading on OMBP compare to AOBP in office	36	18%
H- increase in reading on OMBP compare to AOBP in office	159	79.5%
N- no change in readings	5	2.5%
Total	200	100.0%

Table 12 - This table shows that there is increase in SBP readings in159 participants when manual reading compare with AOBP readings.

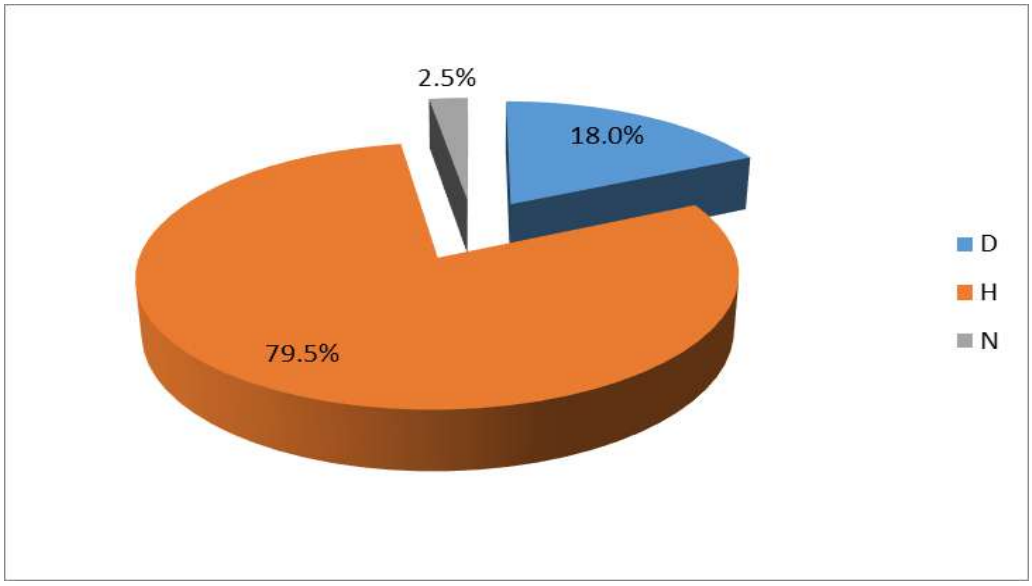

Figure 12 - This figure shows percentage wise distribution of all participants with respect to change their SBP readings, when readings are compared between Manual(Aneroid) in office and Automated Office BP Apparatus (AOBP).

(B) Comparison of average of office Manual BP readings (OMBP) taken with manual apparatus by observer With Automated Office BP apparatus (AOBP) BP readings in all participants

Calculation and comparison of SBP magnitude

OMBP-AOBP SBP READINGS	No. of cases	Percentage
> -5	14	7.0%
< -5	22	11%
0	5	2.5%
+5	54	27.0%
5+10	57	28.5%
>+10	48	24%
Total	200	100.0%

Table 13 - This table shows the magnitude of change of SBP readings of Manual (aneroid) in comparison of AOBP in office.

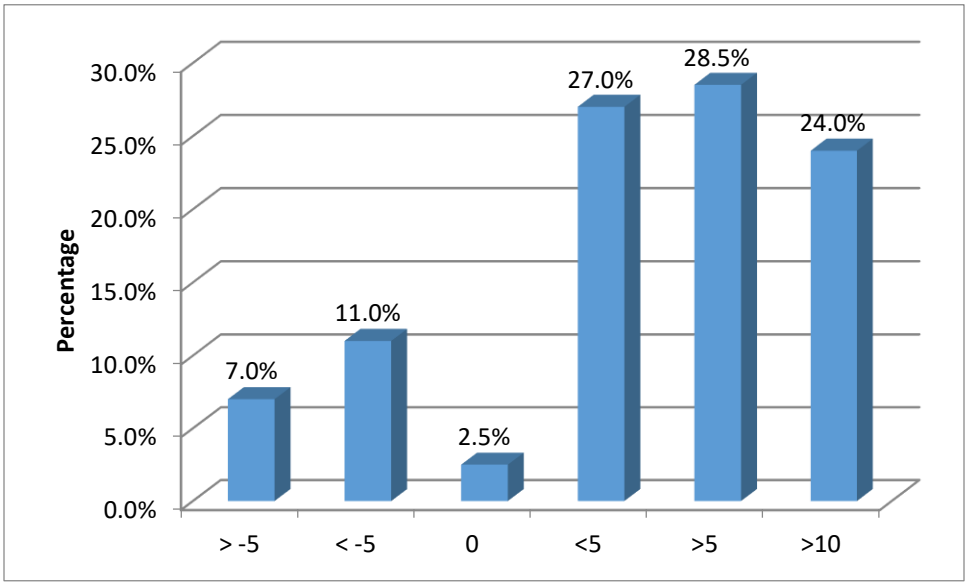

Figure 13 - This figure shows the magnitude of change of SBP readings of Manual (aneroid) in comparison of AOBP in office in all participants' percentage wise

(B) Comparison of average of office Manual BP readings (OMBP) taken with manual apparatus by observer With Automated Office BP apparatus (AOBP) BP readings in all participants

Comparison of DBP readings

MANUAL(ANEROID)-AOBP DBP READINGS	No. of cases	Percentage
D -decrease in reading on OMBP compare to AOBP in office	53	26.5%
H -increase in reading on OMBP compare to AOBP in office	139	69.5%
N- no change in readings	8	4.0%
Total	200	100.0%

Table 14 – This table shows change in DBP readings when OMBP and AOBP compared. manual readings shows increase in DBP readings in 139 participants ,

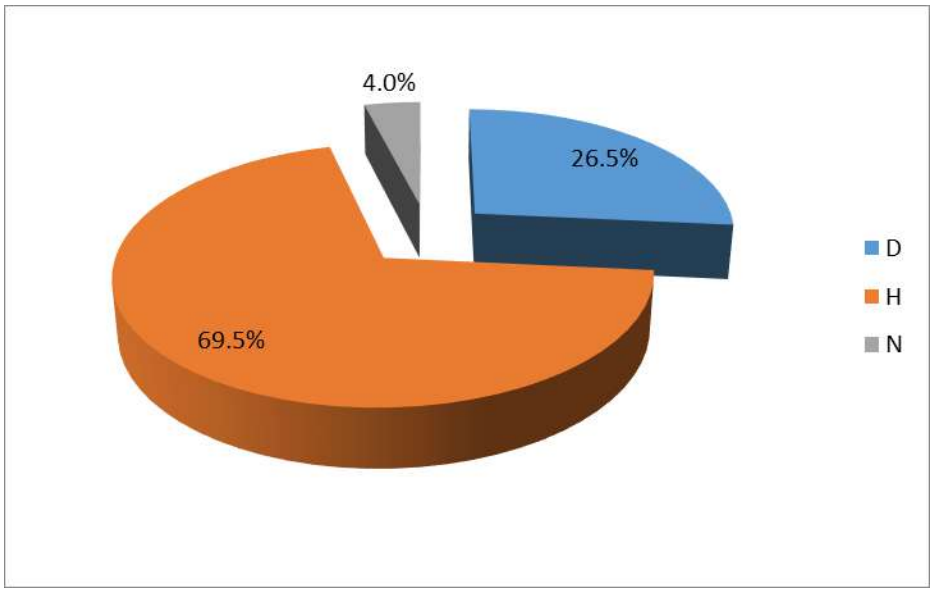

Figure 14 - This figure shows change in DBP readings when OMBP and AOBP compared.

(B) Comparison of average of office Manual BP readings (OMBP) taken with manual apparatus by observer With Automated Office BP apparatus (AOBP) BP readings in all participants

Calculation and comparison of DBP magnitude

OMBP-AOBP DBP READINGS	No. of cases	Percentage
> -5	15	7.5%
< -5	38	19.0%
0	8	4.0%
<+5	57	28.5%
5 +10	44	22.0%
>+10	38	19.0%
Total	200	100.0%

Table 15 - This table shows the change in magnitude of DBP readings of Manual (aneroid) in comparison of AOBP.

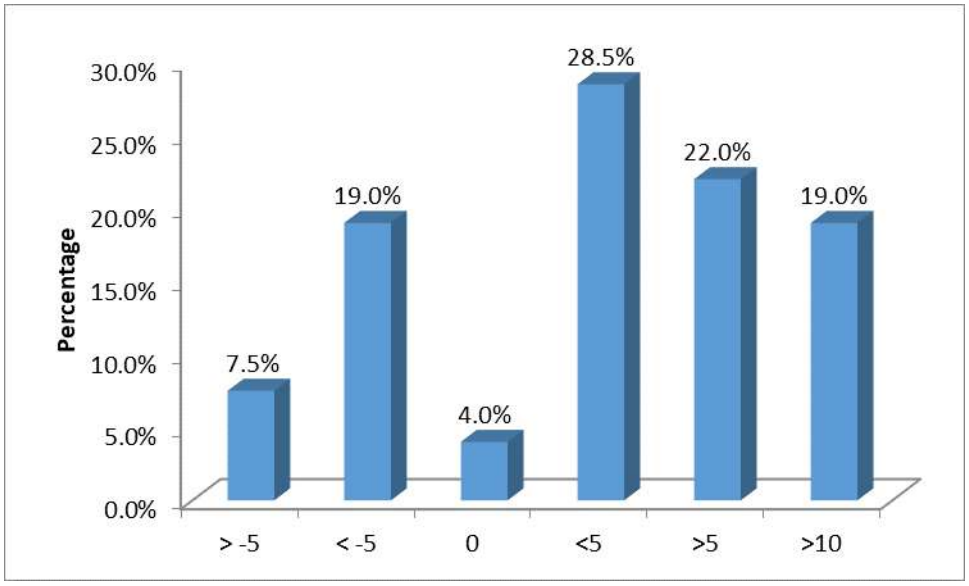

Figure 15 - This figure shows the magnitude of change of SBP readings of Manual(aneroid) OMBP in comparison of AOBP reading.

(B) Comparison of average of office Manual BP readings (OMBP) taken with manual apparatus by observer With Automated Office BP apparatus (AOBP) BP readings in all participants

OMBP-AOBP PULSE READINGS	No. of cases	Percentage
D -decrease in reading on OMBP compare to AOBP in office	41	20.5%
H -decrease in reading on OMBP compare to AOBP in office	143	71.5%
N-No change in readings	16	8.0%
Total	200	100.0%

Table 16- This table shows that there is increase in pulse of 143 participants on manual BP check up by observer.

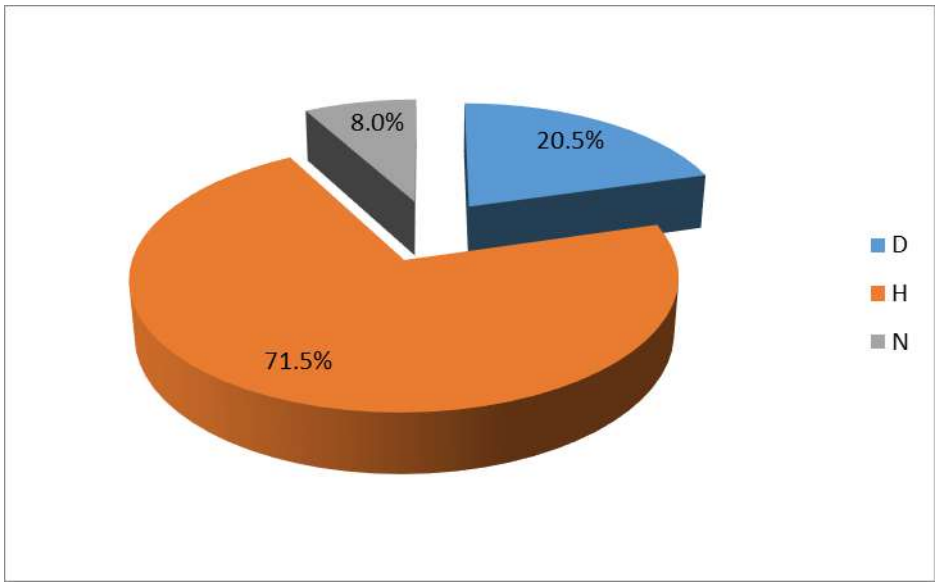

Figure 16 - This figure shows 71.5% participants has increase in pulse readings on manual BP check by observer.

(B) Comparison of average of office Manual BP readings (OMBP) taken with manual apparatus by observer With Automated Office BP apparatus (AOBP) BP readings in all participants

Calculation and comparison of pulse magnitude

OMBP-AOBP PULSE READINGS	No. of cases	Percentage
> -5	15	7.5%
< -5	28	14.0%
0	1 6	8.0%
<+5	55	27.5%
5+10	50	25.0%
>+10	36	18.0%
Total	200	100.0%

Table 17 - This table shows the of change in magnitude of of pulse readings on manual check up compare to AOBP .there is increase in pulse rate >10in 36and 5-10in 50 participants.

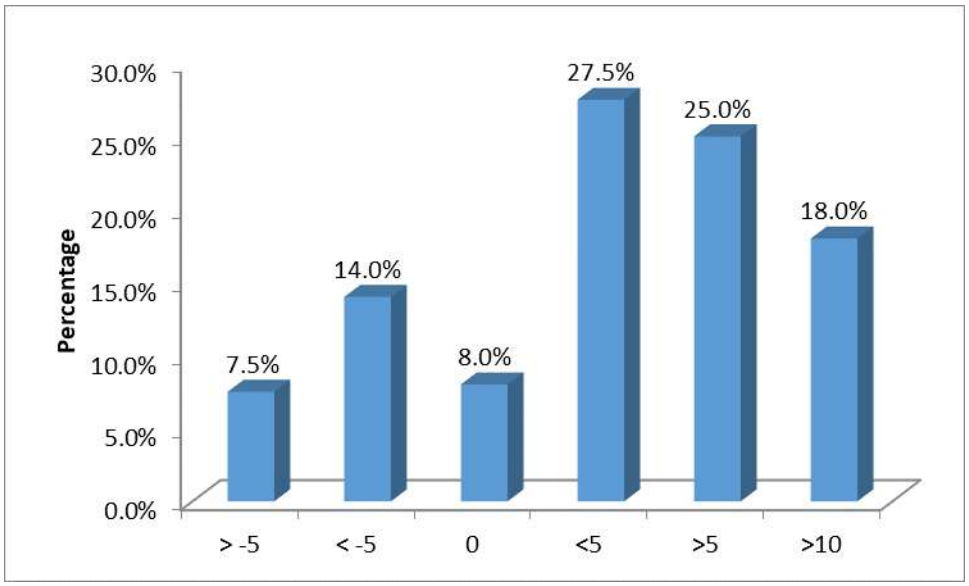

Figure 17 – This figure shows the of change in magnitude of pulse readings on manual check up.

Table 18 – This table shows gender wise distribution of SBP readings in all participants and comparison between hypertensive and non hypertensive

GENDER			HTN				Total	Chi-square value	p-value
			NO		YES				
F	OMBP-AOBP SBP	D- decrease in reading on Manual(aneroid) compare to AOBP in office	5	10.2%	5	33.3%	10	2.803	0.246
		H- increase in reading on Manual(aneroid) compare to AOBP in office	43	87.8%	10	66.7%	53		
		N -no change in reading	1	2.0%	0	0.0%	1		
	Total		49	76.6%	15	23.4%	64		
M	OMBP-AOBP SBP	D- decrease in reading on Manual(aneroid) compare to AOBP in office	22	20.4%	4	14.3%	26	0.558	0.757
		H- increase in reading on Manual(aneroid) compare to AOBP in office	83	76.9%	23	82.1%	106		
		N- no change in reading	3	2.8%	1	3.6%	4		
	Total		108	79.4%	28	20.6%	136		

participants.

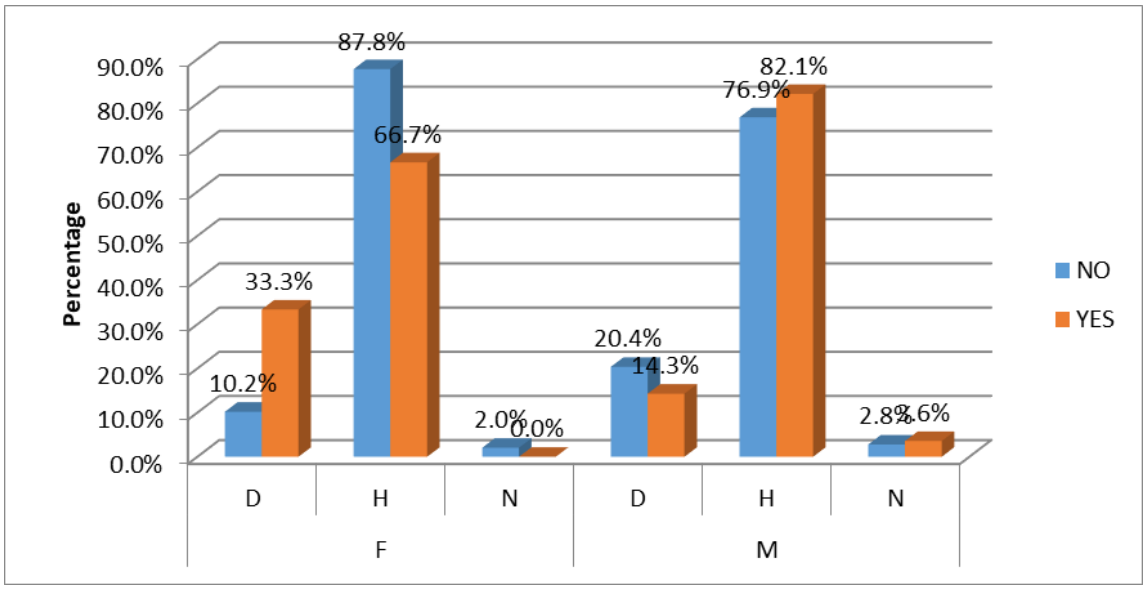

Figure 18 – This figure shows gender wise distribution of SBP readings in all participants and comparison between hypertensive and non hypertensive participants.

(B) Comparison of average of office Manual BP readings (OMBP) taken with manual apparatus by observer With Automated Office BP apparatus (AOBP) BP readings in all participants

Comparison of mean BP readings

	AOBP BP		OMBP		Difference		T	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD	Mean	SD			Lower	Upper
SBP	126.53	12.02	132.33	13.08	-5.80	8.39	-9.771	0.000	-6.97	-4.63
DBP	77.86	8.24	82.17	7.52	-4.31	7.37	-8.263	0.000	-5.33	-3.28
PULSE	75.89	8.62	80.19	8.90	-4.30	7.83	-7.765	0.000	-5.39	-3.21

Table 19 - This table shows the difference in mean SBP and DBP when AOBP and MOBP compared.

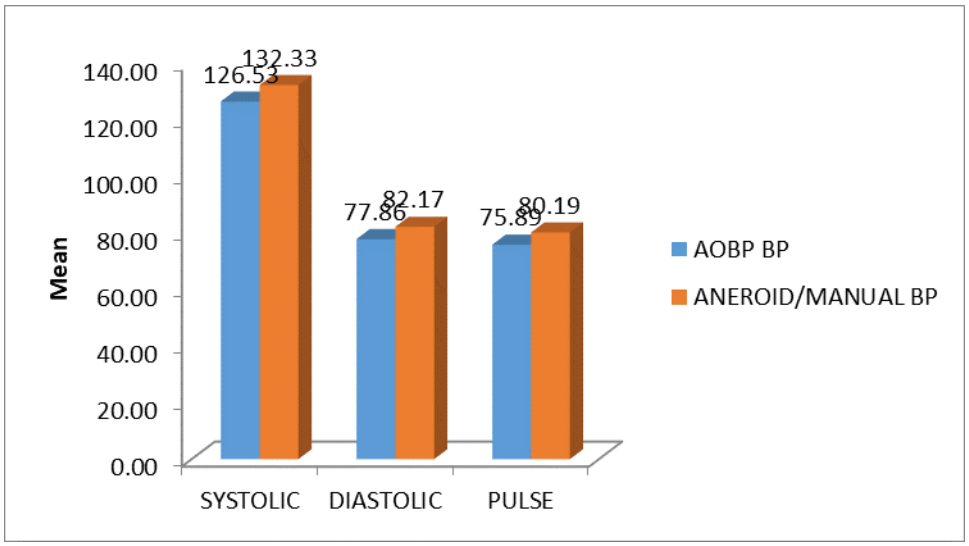

Figure 19- This figure shows the difference in mean SBP and DBP when AOBP and MOBP compared , mean BP reading with AOBP are less when compared with mean BP readings of manual apparatus in office

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Comparison of SBP readings

AOBP- HBPM SBP	No. of cases	Percentage
D- Decrease AOBP –HBPM SBP readings	11	5.5%
H- Increase AOBP –HBPM SBP readings	187	93.5%
N-No change in BP readings	3	1.5%
Total	200	100.0%

Table 20- This table shows change mean SBP readings when AOBP and HMBP compared. there is increase in SBP readings in 187 participants when readings taken AOBP compare with HBPM .

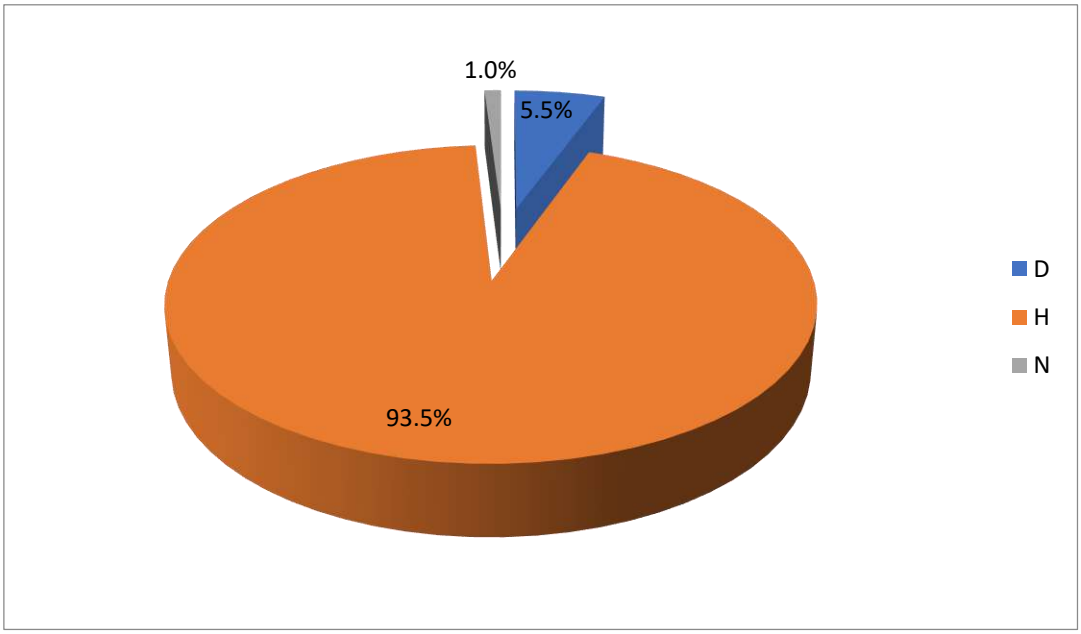

Figure 20 – This figure shows change mean SBP readings when AOBP and HMBP compared.

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Comparison and calculation of SBP magnitude

AOBP-HBPM SBP	No. of cases	Percentage
> -5	3	1.5%
< -5	8	4.0%
0	2	1.0%
<5	13	6.5%
>5	108	54.0%
>10	66	33.0%
Total	200	100.0%

Table 21 - This table shows the change in magnitude of SBP readings.

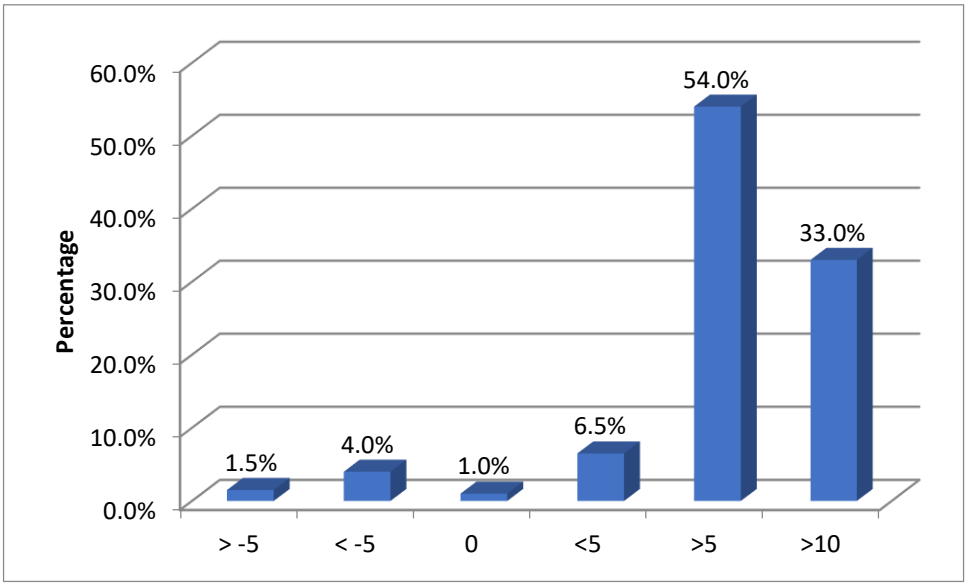

Figure 21- This table shows the percent wise change in magnitude of SBP when HBPM compared with AOBP.

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Comparison of DBP readings

OFFICE-ML H DBP	No. of cases	Percentage
D- Decrease AOBP – HBPM DBP readings	12	6.0%
H- Increase AOBP – HBPM DBP readings	185	92.5%
N-No change in readings	3	1.5%
Total	200	100.0%

Table 22 - This table shows the comparison of DBP readings when AOBP compare with HMBP, there is decrease in DBP readings in 12 participants when readings taken with AOBP compared to HBPM ,but 185 participants has increase in DBP readings on AOBP compare to HBPM.

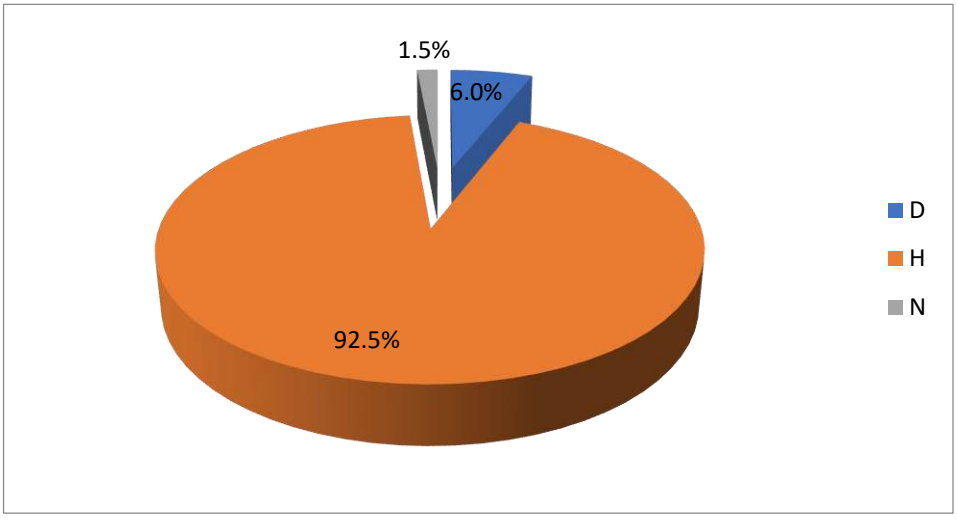

Figure 22– This figure shows the percent distribution of change in DBP readings when AOBP and HBPM.

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Calculation and comparison of DBP magnitude

AOBP-HBPM DBP	No. of cases	Percentage
> -5	5	2.5%
< -5	7	3.5%
0	3	1.5%
<5	69	34.5%
>5	90	45.0%
>10	26	13.0%
Total	200	100.0%

Table 23 - This table shows the change in magnitude of DBP readings when AOBP and HBPM compared.

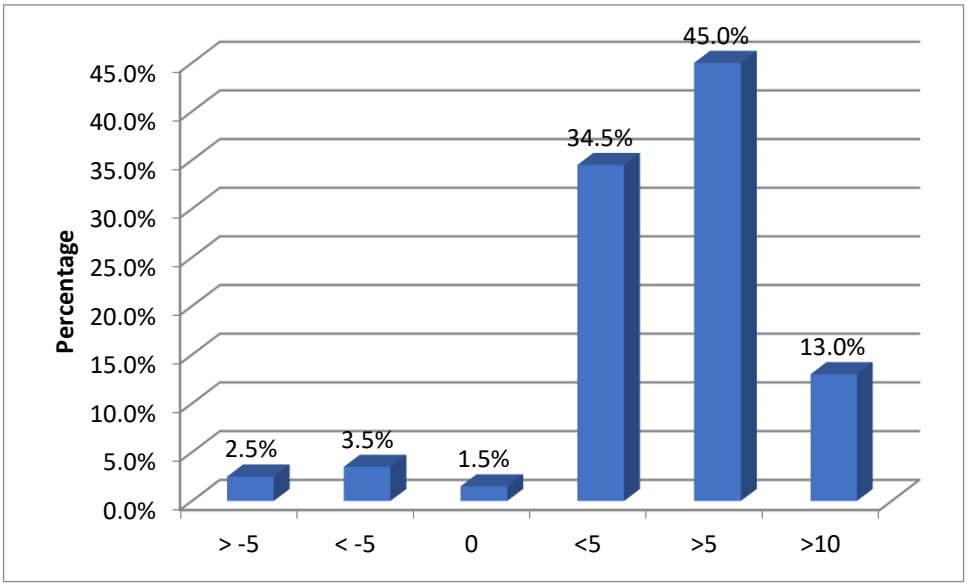

Figure 23 – This figure shows the change in magnitude of DBP readings when AOBP and HBPM compared.

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Calculation of pulse

AOBP-HBPM Pulse Readings	No. of cases	Percentage
D- Decrease AOBP –HBPM Pulse readings	115	57.5%
H- increase AOBP –HBPM Pulse readings	76	38.0%
N-no change in reading	9	4.5%
Total	200	100.0%

Table 24 - This table shows change in pulse readings when AOBP and HBPM compared, there is decrease in pulse readings in 115 participants when readings taken with AOBP compared to HBPM at ,76 participants has increase in readings and 9 has no changes in pulse readings.

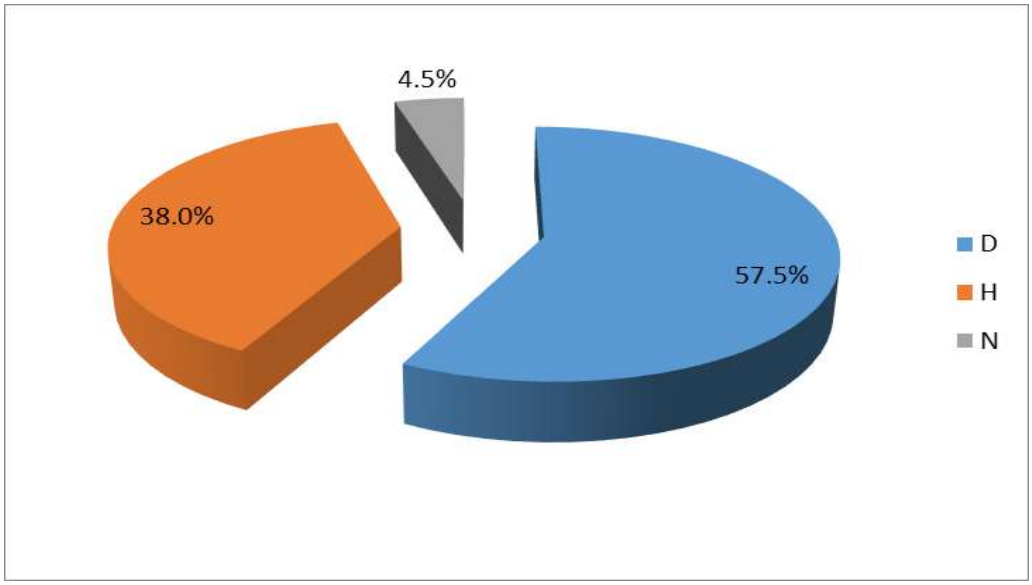

Figure 24 – This figure shows change in pulse readings when AOBP and HBPM compared, there is decrease in pulse in 57.5% participants when readings taken with AOBP and compared HBPM.

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Calculation of pulse magnitude

AOBP-HBPM PULSE	No. of cases	Percentage
> -5	34	17.0%
< -5	81	40.5%
0	9	4.5%
<+5	30	15.0%
5-10	21	10.5%
>+10	25	12.5%
Total	200	100.0%

Table 25 – This table shows change in magnitude of pulse when AOBP and HBPM compared, there is decrease in pulse readings in 115 participants when readings taken with AOBP compared to HBPM ,34 participants has decrease in readings >5/minute and 81 participants decrease 0-5 beats /minutes.

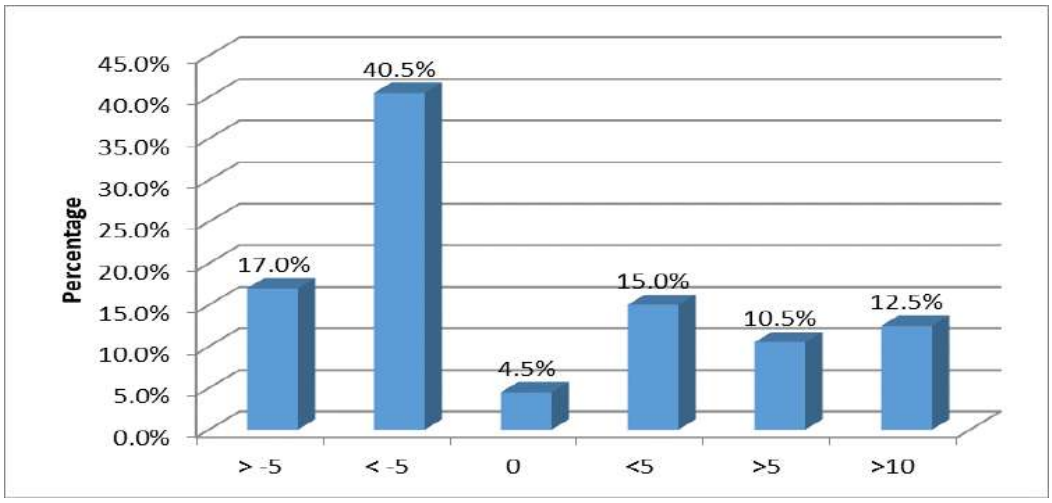

Figure 25- This figure shoes change in magnitude of pulse when AOBP and HBPM compared.

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

GENDER			HTN				Total	Chi-square value	p-value
			NO		YES				
F	AOBP-HBPM SBP	D- Decrease AOBP – HBPM SBP readings	2	4.1%	0	0.0%	2	0.632	0.427
		H- Increase AOBP – HBPM SBP readings	47	95.9%	15	100.0%	62		
		N-No change in readings	0	0.0%	0	0.0%	0		
	Total		49	76.6%	15	23.4%	64		
M	AOBP-HBPM SBP	D- Decrease AOBP – HBPM SBP readings	8	7.4%	1	3.6%	9	1.091	0.579
		H- Increase AOBP – HBPM SBP readings	98	90.7%	27	96.4%	125		
		N-No change in readings	2	1.9%	0	0.0%	2		
	Total		108	79.4%	28	20.6%	136		

Table 26 -This table shows gender wise distribution of SBP readings in all participants and comparison between hypertensive and non hypertensive participants.

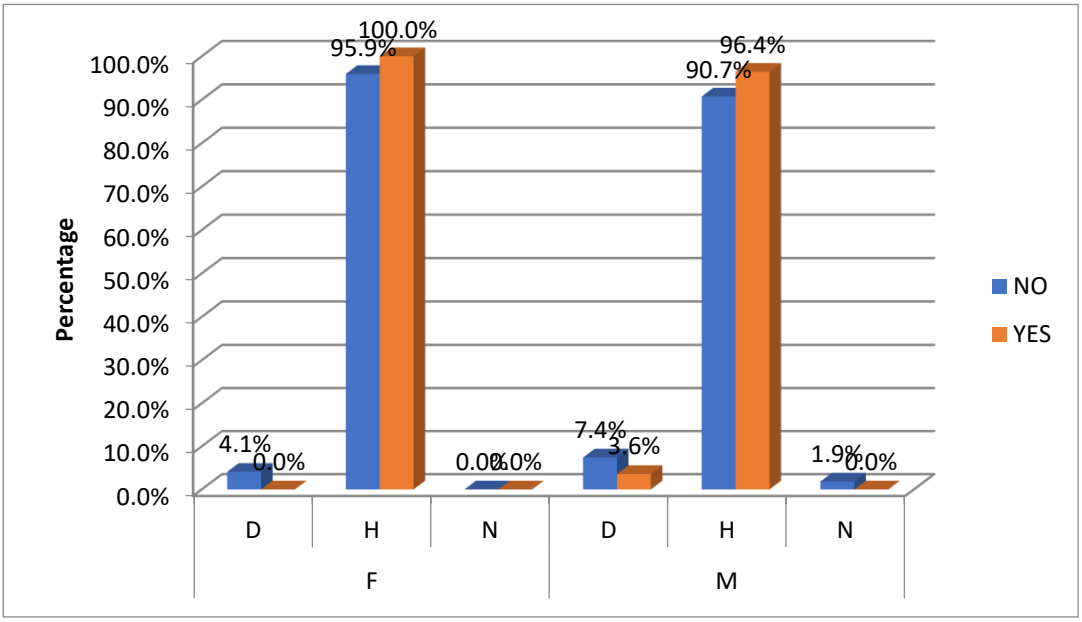

Figure 26 - This figure shows gender wise distribution of SBP readings in all participants and comparison between hypertensive and non hypertensive participants.

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Comparison of mean BP readings

	HBPM BP		AOBP BP		Difference		T	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD	Mean	SD			Lower	Upper
SBP	117.13	9.49	126.53	12.02	-9.40	6.20	-21.438	0.000	-10.26	-8.54
DBP	71.72	6.05	77.86	8.24	-6.15	4.84	-17.953	0.000	-6.82	-5.47
PULSE	76.50	8.70	75.89	8.62	0.61	8.50	1.015	0.311	-0.58	1.80

Table 27-This table shows the comparison of mean SBP on HBPM and AOBP. ON HBPM readings mean of SBP is 117.13 mm hg mean DBP is 71.72 mm hg ,But on AOBP mean SBP is 126.53 mm hg and mean DBP is 77.86 mm hg.

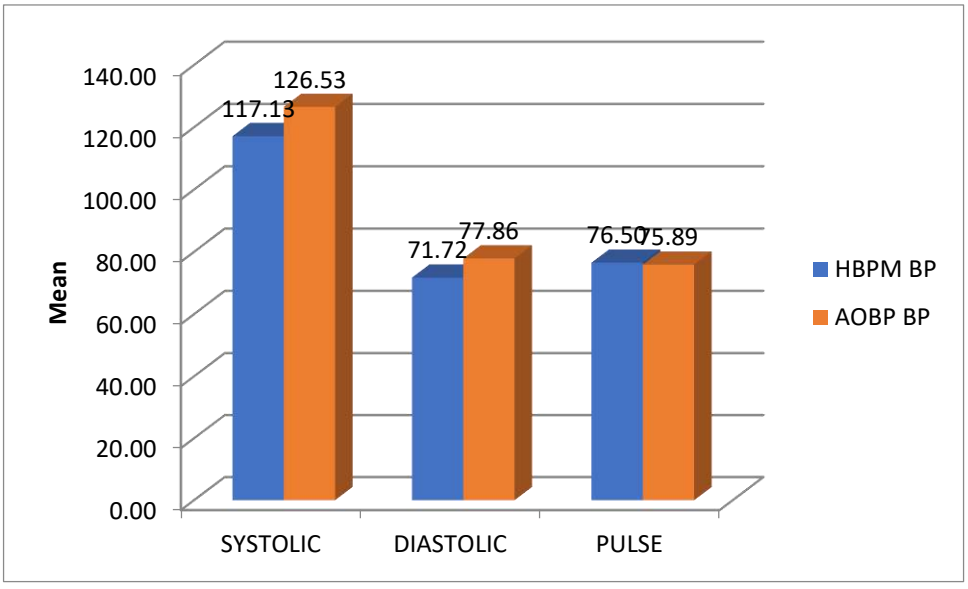

Figure 27 -This figure shows the comparison of mean SBP on HBPM and AOBP.

(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Comparison of SBP readings

OMBP-HBPM SBP Readings	No. of cases	Percentage
D-Decrease in OMBP-HBPM SBP Readings	13	6.5%
H- Decrease in OMBP-HBPM SBP Readings	185	92.5%
N-No change in readings	2	1.0%
Total	200	100.0%

Table 28 - This table shows change in SBP readings when OMBP and HBPM compared.

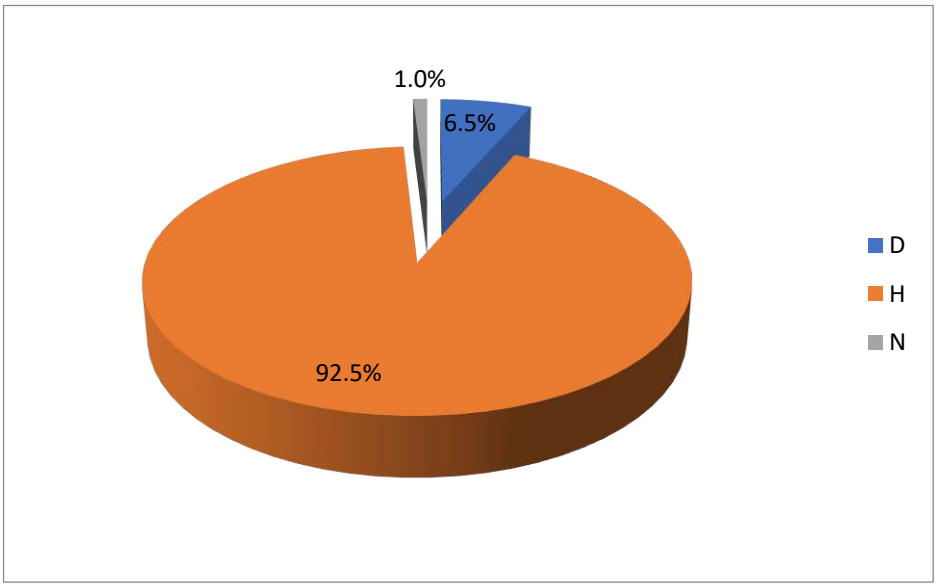

Figure 28 - This figure shows percent wise distribution of participant along with change in SBP readings when OMBP and HBPM compared.

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(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Calculation and comparison of SBP magnitude

OMBP-HBPM SBP READINGS	No. of cases	Percentage
> -5	4	2.0%
< -5	9	4.5%
0	2	1.0%
<5	14	7.0%
>5	24	12.0%
>10	147	73.5%
Total	200	100.0%

Table 29 - This table shows comparison of change in magnitude of SBP readings when OMBP and HBPM compared.

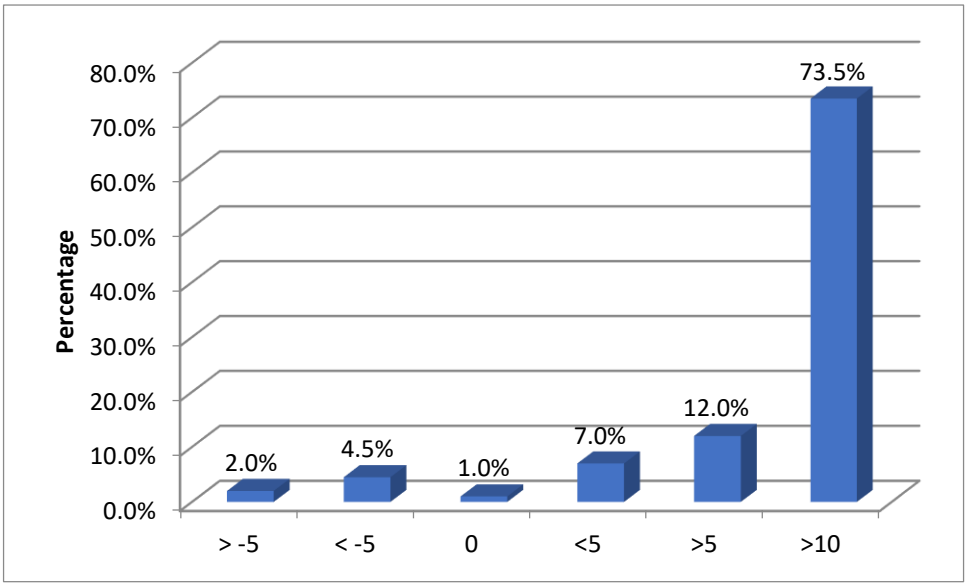

Figure 29 - This figure shows percent wise change in magnitude of SBP readings when OMBP and HBPM compared.

(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Comparison of DBP readings

OMBP-HBPM DBP READINGS	No. of cases	Percentage
D- Decrease in OMBP-HBPM DBP Readings	11	5.5%
H- Increase in OMBP-HBPM DBP Readings	183	91.5%
N-No change in readings	6	3.0%
Total	200	100.0%

Table 30 - This table shows change in DBP readings when OMBP and HBPM compared

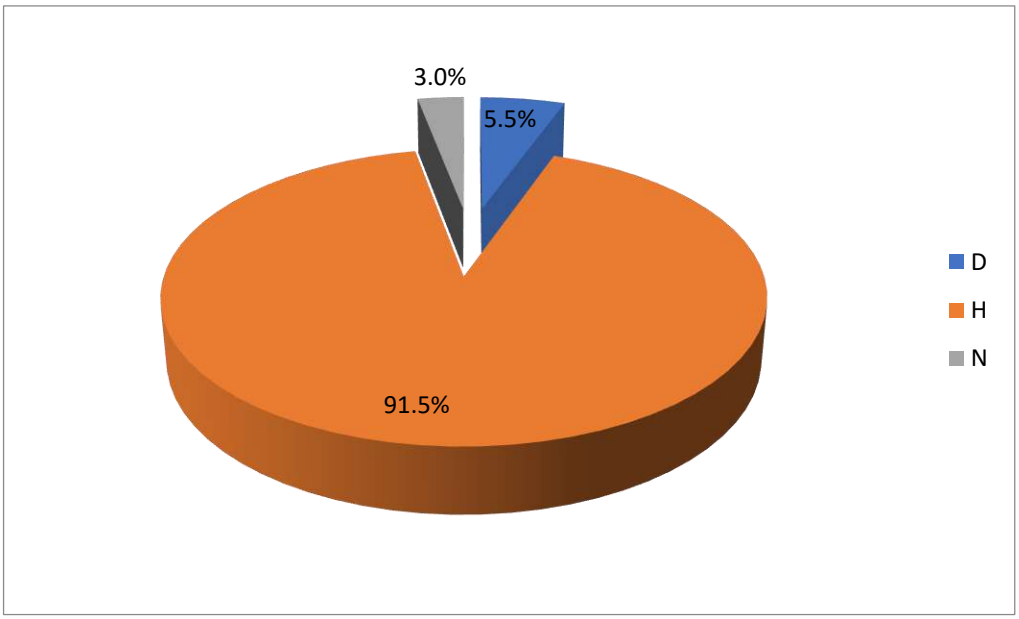

Figure 30- This figure shows percent wise distribution of participant along with change in DBP readings when OMBP and HBPM compared.

(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Comparison and calculation of DBP magnitude

OMBP-HBPM DBP READINGS	No. of cases	Percentage
> -5	4	2.0%
< -5	7	3.5%
0	6	3.0%
<5	30	15.0%
>5	57	28.5%
>10	96	48.0%
Total	200	100.0%

Table 31 - This table shows comparison of change in magnitude of readings when OMBP and HBPM compared and percent wise distribution of participant.

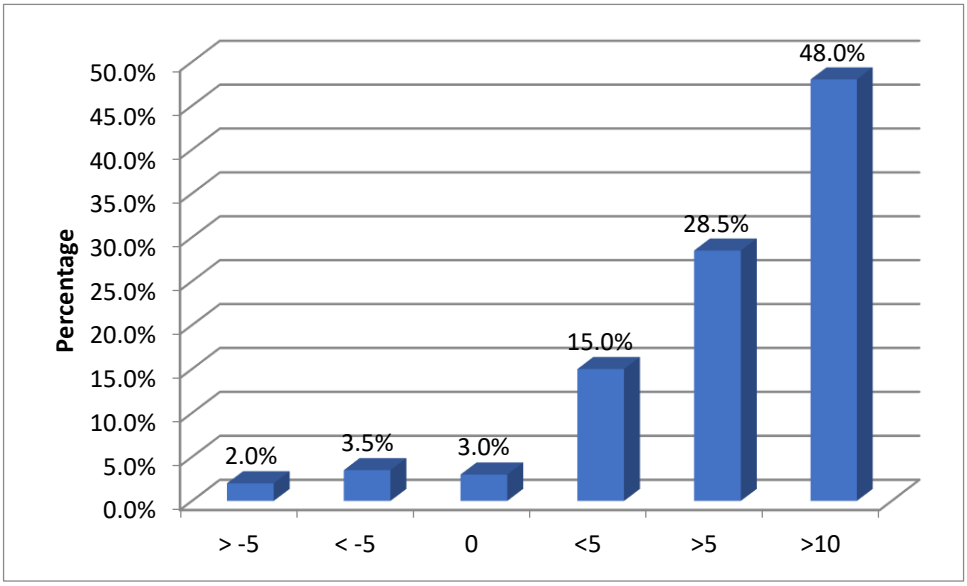

Figure 31 - This figure shows the percent wise comparison of change in magnitude of readings when OMBP and HBPM compared.

(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Comparison of pulse

OMBP-HBPM PULSE READINGS	No. of cases	Percentage
D- Decrease in OMBP-HBPM Pulse Readings	61	30.5%
H - Increase in OMBP-HBPM Puse Readings	129	64.5%
N- no change in readings	10	5.0%
Total	200	100.0%

Table 32 - This table shows the comparison of OMBP and HBPM pulse readings.

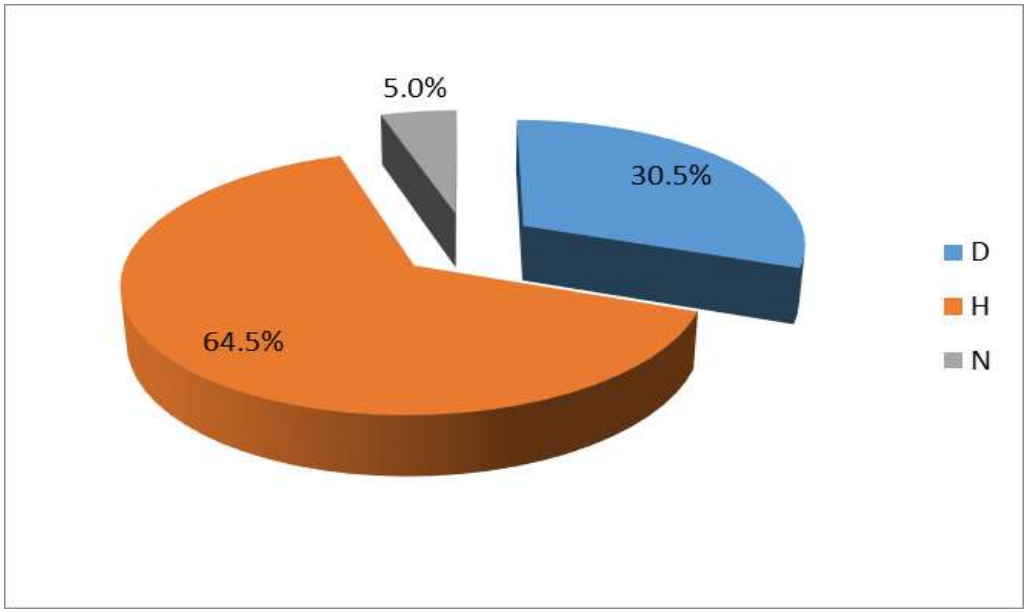

Table 32 - This figure shows the comparison of OMBP and HBPM pulse readings.

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(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Calculation and comparison of pulse magnitude

OMBP-HBPM PULSE READINGS	No. of cases	Percentage
> -5	25	12.5%
< -5	39	19.5%
0	10	5.0%
<+5	44	22.0%
5-10	41	20.5%
>+10	41	20.5%
Total	200	100.0%

Table 33- This table shows the change in magnitude of pulse when OMBP compare with HBPM.

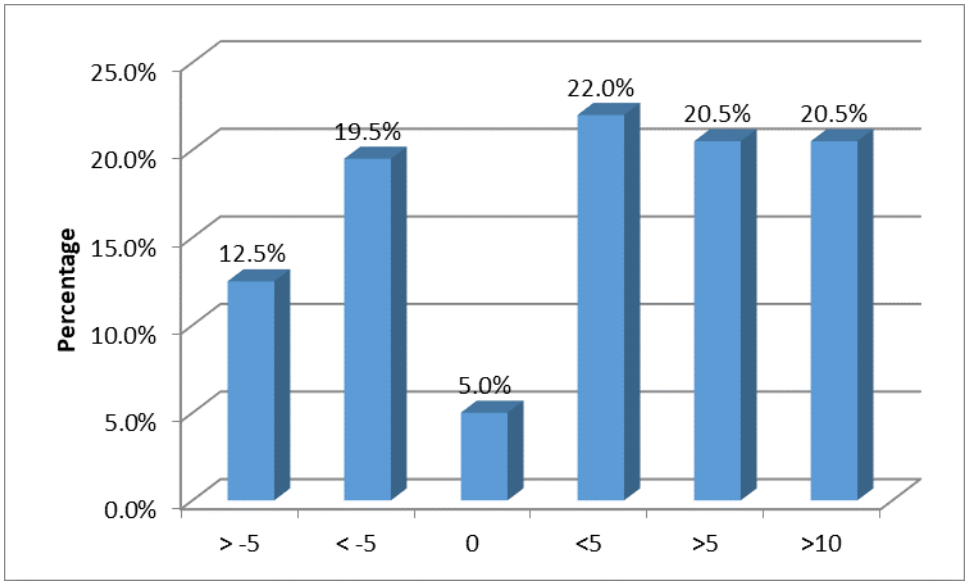

Figure 33 - This figure shows the change in magnitude of pulse when OMBP compare with HBPM

(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

Comparison of BP readings in hypertensive and non-hypertensive participants and gender wise analysis

GENDER		HTN				Total	Chi-square value	p-value
		NO	NO	YES	YES			
F	D- Decrease OMBP –HBPM SBP readings	1	2.0%	1	6.7%	2	5.775	0.056
	H- Increase OMBP –HBPM SBP readings	48	98.0%	14	93.3%	62		
	N-No change in readings	0	0.0%	0	0.0%	0		
M	D- Decrease OMBP –HBPM SBP readings	11	10.2%	0	0.0%	11	1.273	0.529
	H- Increase OMBP –HBPM SBP readings	95	88.0%	28	100.0 %	123		
	N-No change in readings	2	1.9%	0	0.0%	2		

Table 34 - This table showes precent distribution of change in BP readings in all male and female participants , compared in hypertenive and non hyperetensive individules.

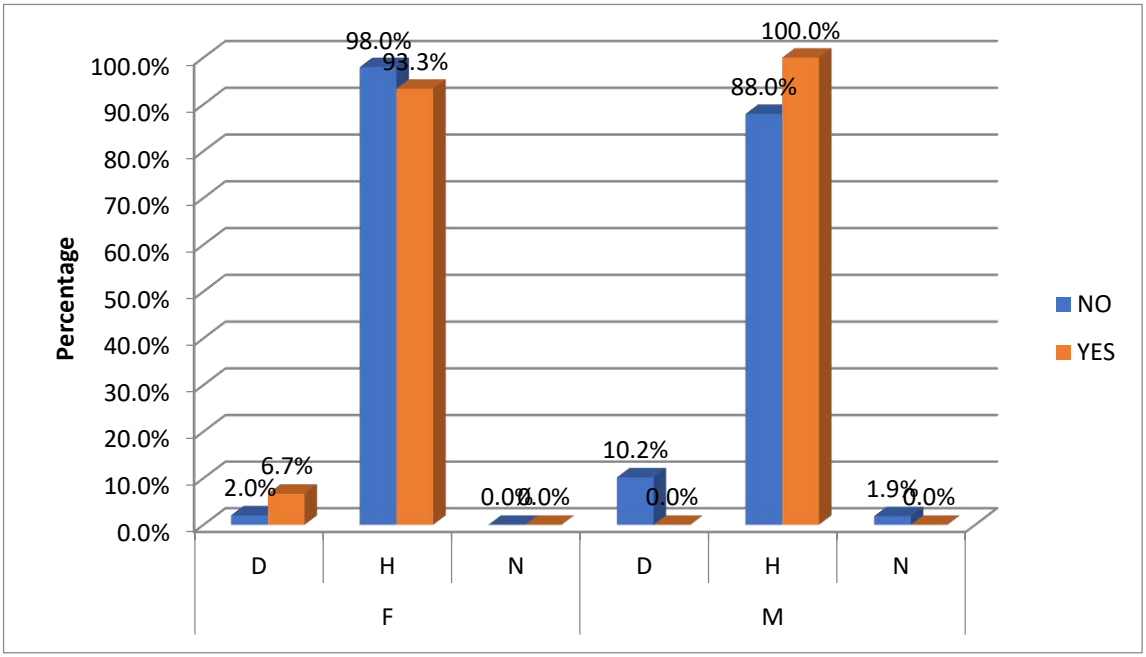

Figure 34 - This figure showes precent distribution of change in BP readings in all male and female participants , compared in hypertenive and non hyperetensive individules.

(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP meausrments (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

	HBPM		OMBP		Difference		t	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD	Mean	SD			Lower	Upper
SBP	117.13	9.49	132.33	13.08	-15.20	9.80	-21.943	0.000	-16.57	-13.83
DBP	71.72	6.05	82.17	7.52	-10.45	7.54	-19.595	0.000	-11.50	-9.40
PULSE	76.50	8.70	80.19	8.90	-3.69	9.50	-5.494	0.000	-5.01	-2.37

Table 35 - This table shows the difference between mean of SBP and DBP readings when OMBP and HBPM compared.

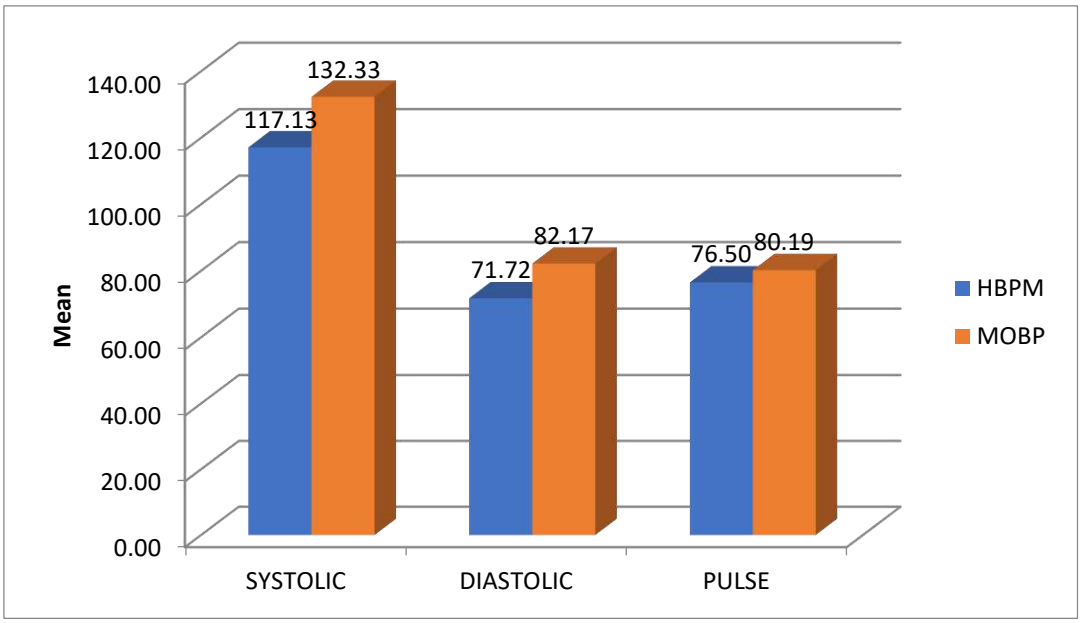

Figure 35 - This figure shows the difference between mean of SBP and DBP readings when OMBP and HBPM compared.

(E) Comparison of average office Manual BP readings (OMBP) with with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

Comparison of SBP readings

MANUAL(ANEROID)-OSCILLOMETRIC(DIGITAL) APPARATUS OF SBP READINGS	No. of cases	Percentage
D-decrease in OMBP – OABP readings for SBP	68	34.0%
H -increase in OMBP –OABO BP readings for SBP	124	62.0%
N-no change in reading	8	4.0%
Total	200	100.0%

Table 36 - This table shows comparison of mean SBP readings in OMBP and OABP, there is increase in SBP readings in 124 participant when BP taken with manual(aneroid) apparatus in office and compared with OABP.

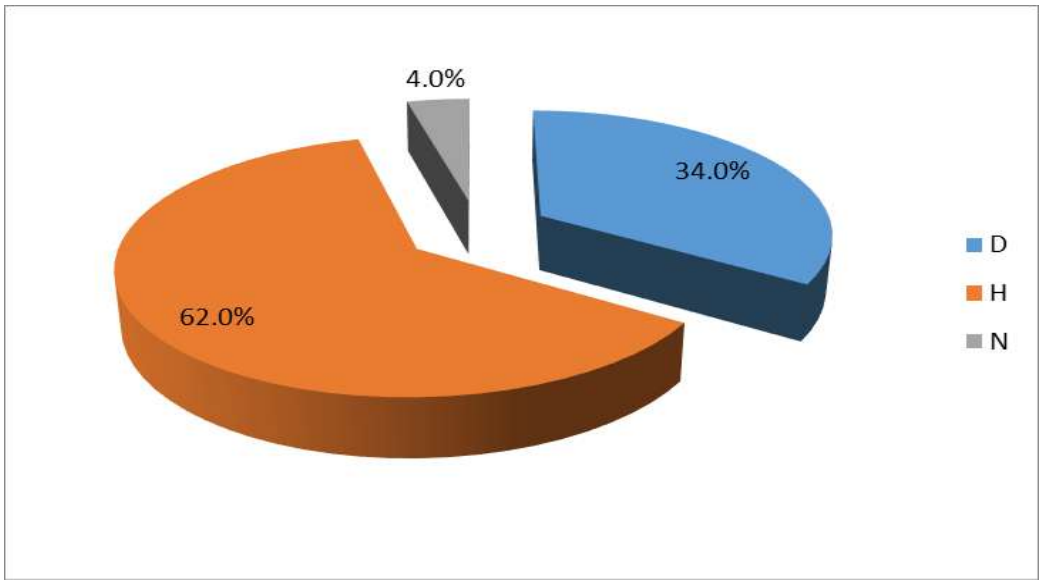

Figure 36 - This table shows comparison of mean SBP readings in OMBP and OABP,This figure shows 62% participants increase in SBP readings when BP taken with manual (aneroid) apparatus in office and compared with OABP.

(E) Comparison of average office Manual BP readings (OMBP) with with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

Calculation and comparison of SBP magnitude

OABP-OMBP SBP	No. of cases	Percentage
> -5	25	12.5%
< -5	43	21.5%
0	8	4.0%
<+5	53	26.5%
5-10	50	25.0%
>+10	21	10.5%
Total	200	100.0%

Table 37 - This table shows change in magnitude of SBP readings, there is increase in SBP readings in participant when BP taken with manual(aneroid) apparatus in office and OABP.

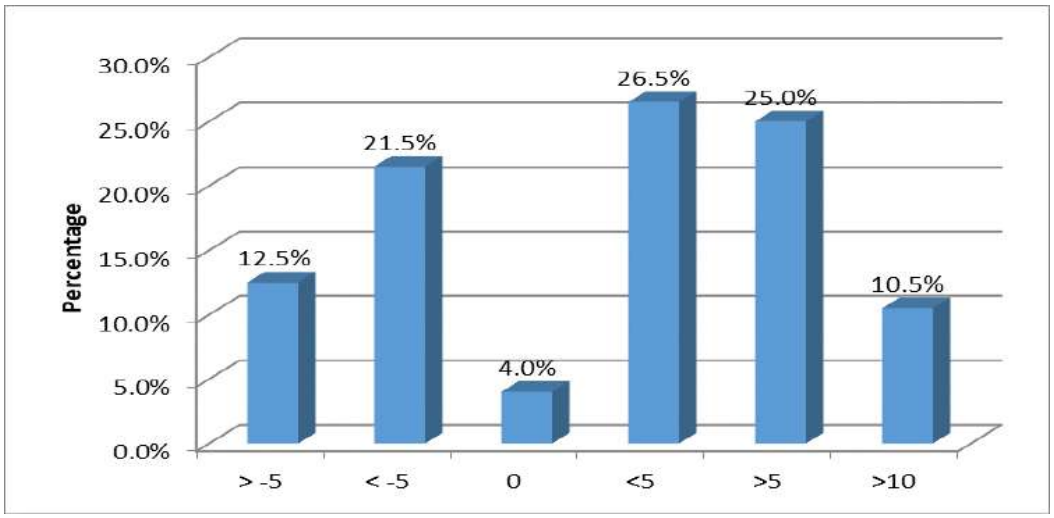

Figure 37 – This figure shows change in magnitude of SBP readings, there is increase in SBP.

(E) Comparison of average office Manual BP readings (OMBP) with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

Comparison of DBP readings

OMBP-OABP DBP READINGS	No. of cases	Percentage
D –decrease in OMBP –OABP BP readings for DBP	78	39.0%
H -increase in OMBP –OABP BP readings for DBP	113	56.5%
N no change in readings	9	4.5%
Total	200	100.0%

Table 38 - This table shows comparison of DBP readings when OABP and OMBP compared, there is increase in DBP readings in 113 participant when BP taken with manual(aneroid) apparatus in office and compared with OABP.

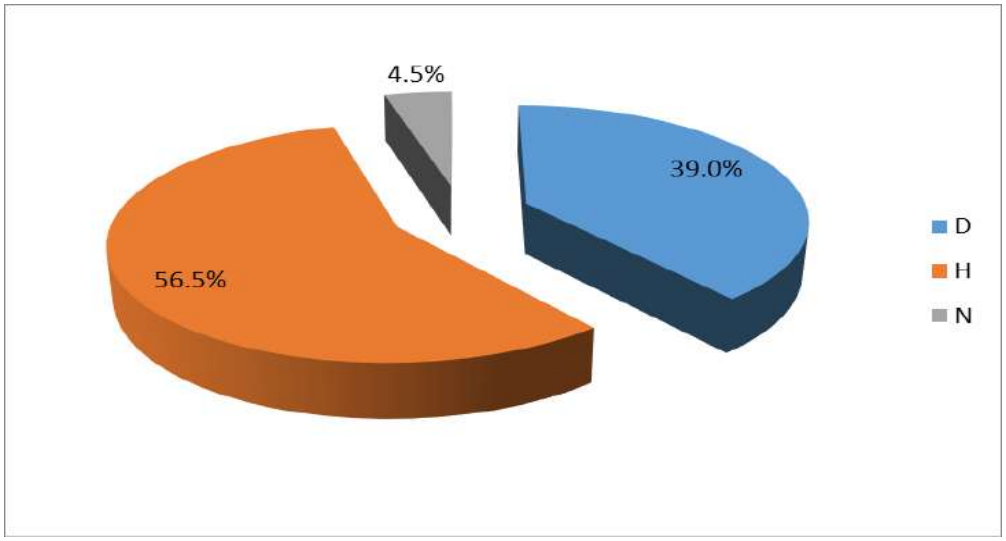

Figure 38 - This figure shows comparison of DBP readings when OABP and OMBP compared,

(E) Comparison of average office Manual BP readings (OMBP) with with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

Calculation and comparison of DBP magnitude

OABP-OMBP DBP	No. of cases	Percentage
> -5	32	16.0%
< -5	46	23.0%
0	9	4.5%
<+5	52	26.0%
5-10	47	23.5%
>+10	14	7.0%
Total	200	100.0%

Table 39 - This table shows change in magnitude of DBP readings when OMBP and OABP.

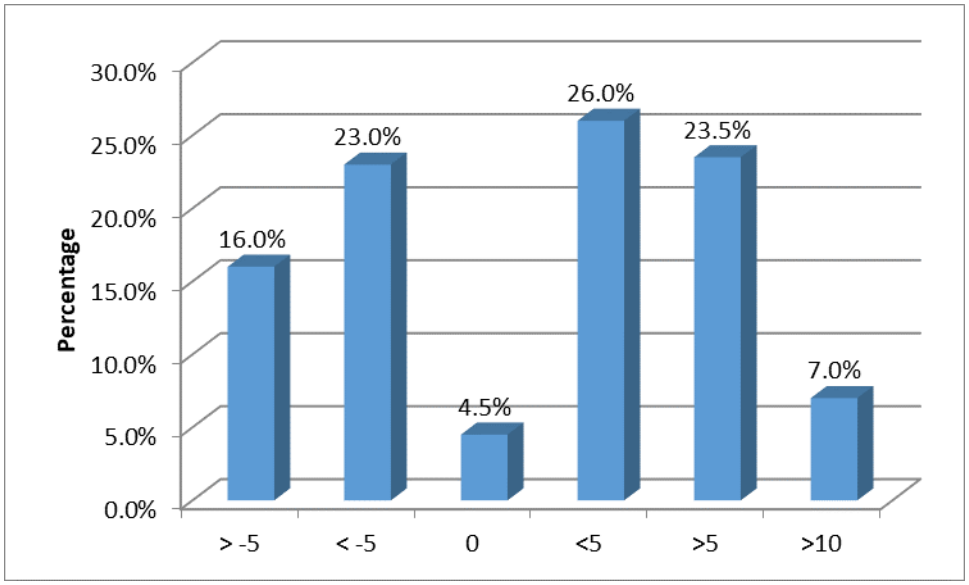

Figure 39 - This table shows change in magnitude of DBP readings when OMBP and OABP compared.

(E) Comparison of average office Manual BP readings (OMBP) with with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

Comparison of pulse

MANUAL(ANEROID) - OSCILLOMETRIC(DIGITAL) APPARATUS OFFICE PULSE READINGS	No. of cases	Percentage
D –decrease in OMBP–OABP in office pulse reading	65	32.5%
H -increase in OMBP–OABP in office pulse readings	116	58.0%
N- no change in readings	19	9.5%
Total	200	100.0%

Table 40 -This table shows comparison of pulse readings in OMBP AND OABP readings.

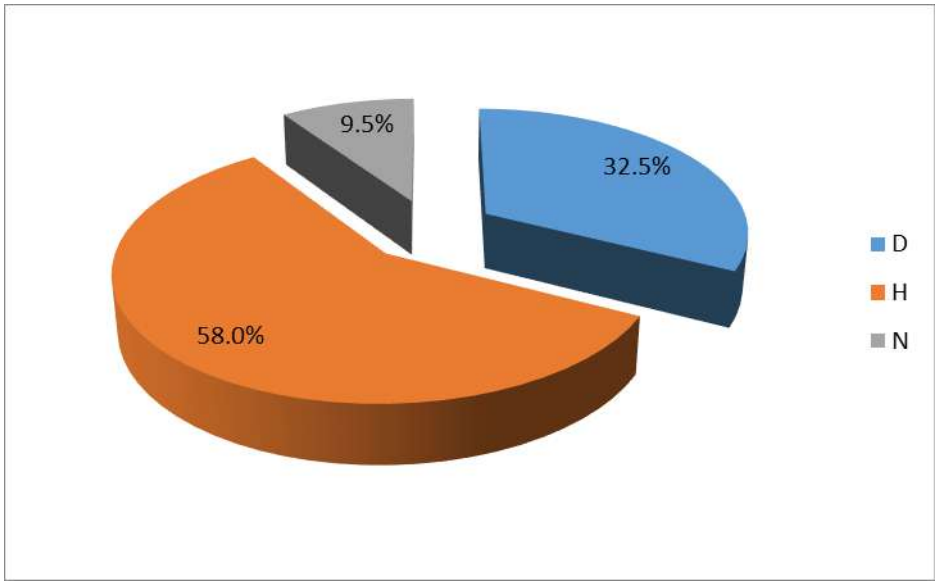

Figure 40 - This figure shows comparison of pulse readings in OMBP AND OABP readings.

(E) Comparison of average office Manual BP readings (OMBP) with with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

Calculation and comparison of pulse magnitude

OABP-OMBP PULSE	No. of cases	Percentage
> -5	40	20.0%
< -5	27	13.5%
0	19	9.5%
<5	44	22.0%
>5	39	19.5%
>10	31	
Total	200	100.0%

Table 41 - This table shows comparison of pulse with manual(aneroid) apparatus in office and compared with OABP readings.

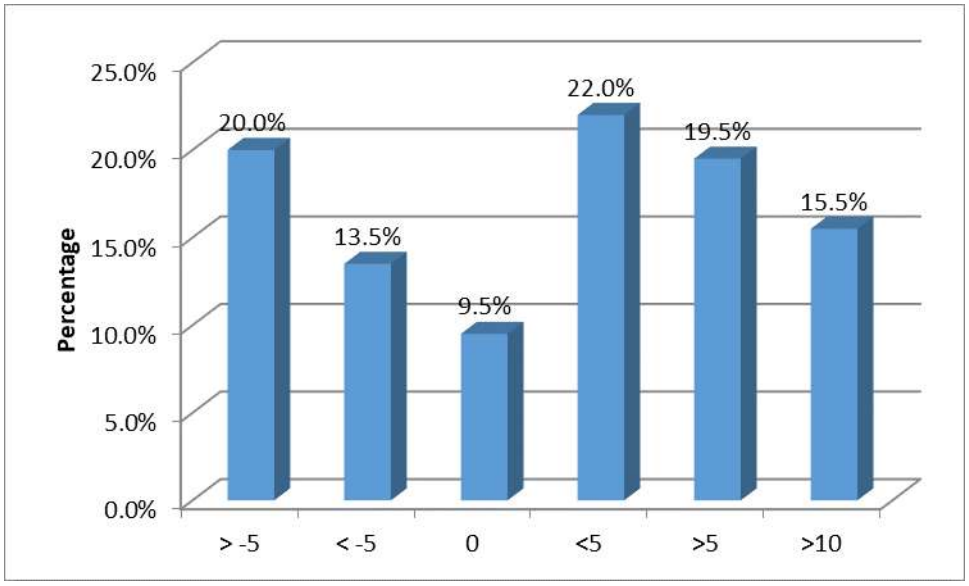

Figure 41- This figure shows comparison of pulse with manual(aneroid) apparatus in office and compared with OABP readings..

(E) Comparison of average office Manual BP readings (OMBP) with with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

Comparison of BP readings in hypertensive and non hypertensive participants and gender wise analysis

GENDER			HTN				Total	Chi-square value	p-value
			NO		YES				
F	OABP-OMBP SBP	D- decrease in OMBP–OABP BP readings for SBP	17	34.7%	3	20.0%	20	3.938	0.14
		H -increase in OMBP–OABP BP readings for SBP	31	63.3%	10	66.7%	41		
		N	1	2.0%	2	13.3%	3		
	Total		49	76.6%	15	23.4%	64		
M	OABP-OMBP SBP	D -decrease in OMBP–OABP BP readings for SBP	40	37.0%	8	28.6%	48	1.665	0.435
		H -increase in OMBP–OABP BP readings for SBP	65	60.2%	18	64.3%	83		
		N	3	2.8%	2	7.1%	5		
	Total		108	79.4%	28	20.6%	136		

Table 42 – This table shows gender wise distribution of SBP readings in all participants and comparison between hypertensive and non hypertensive participants. Both hypertensive and non hypertensive participants shows increase in SBP readings on manual check up.

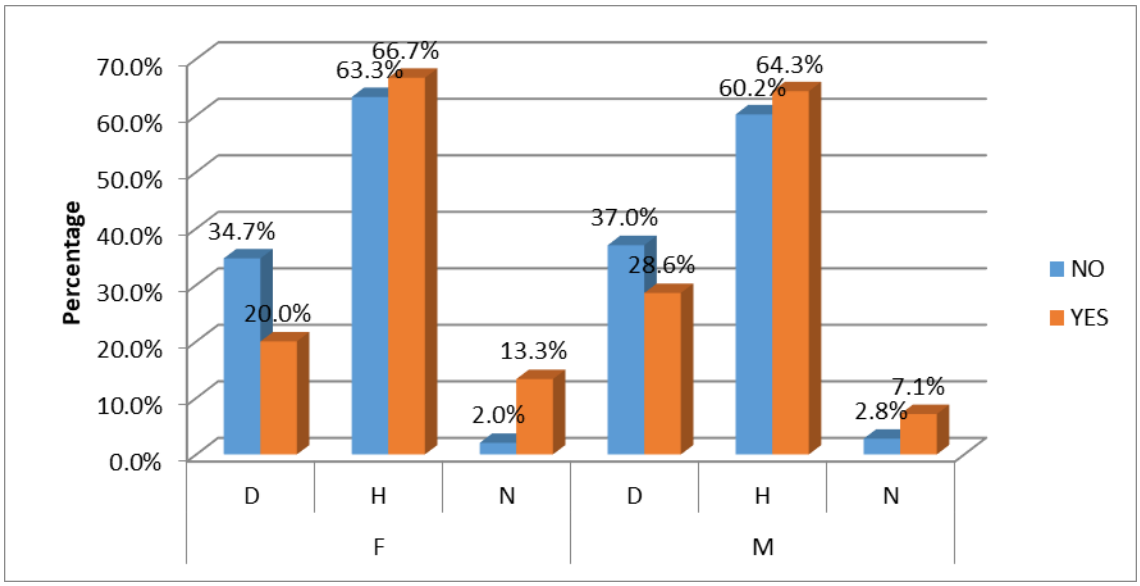

Figure 42 - This figure shows that both gender all non hypertensive and hypertensive participants shows rise in SBP readings when BP readings taken with manual apparatus ,consolidates the effect of observer on BP readings.

(E) Comparison of average office Manual BP readings (OMBP) with with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

Comparison of mean BP readings

	OABP BP		OMBP BP		Difference		T	p-value	95% Confidence Interval of the Difference	
	Mean	SD	Mean	SD	Mean	SD			Lower	Upper
SBP	130.10	11.44	132.33	13.08	-2.22	7.96	-3.952	0.000	-3.34	-1.11
DBP	80.94	7.93	82.17	7.52	-1.23	7.90	-2.194	0.029	-2.33	-0.12
Pulse	77.54	9.28	80.19	8.90	-2.65	8.51	-4.396	0.000	-3.83	-1.46

Table 43 – This table shows the difference in mean of SBP and DBP readings comparison with OABP and with OMBP.

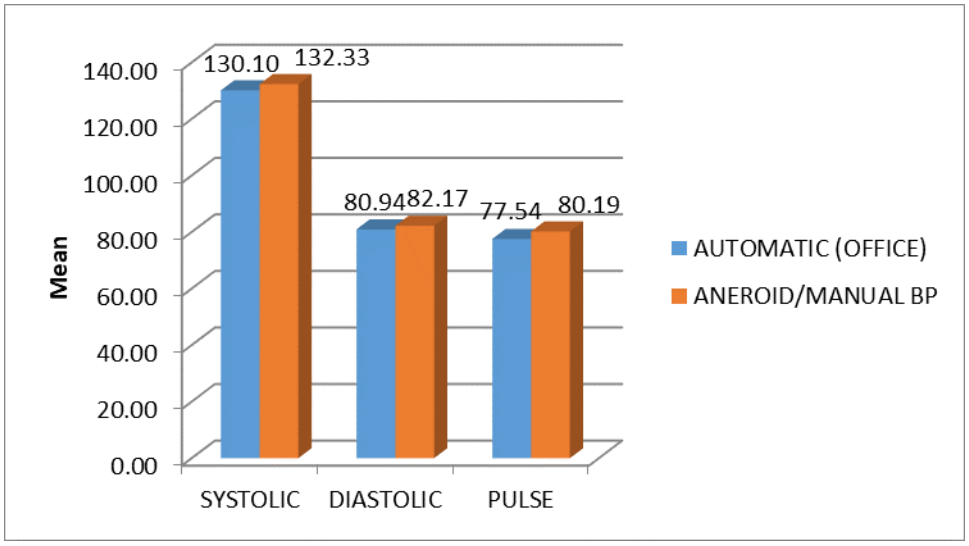

Figure 43 - This figure shows the difference in mean of SBP and DBP readings comparison with OABP and with OMBP

	HBPM-SBP Readings	HBPM-DBP Readings	OABP-SBP Readings	OABO-DBP Readings	AOBP-SBP Readings	AOBP-DBP Readings	OMBP-SBP Readings	OMBP-DBP Readings
Total Participants	117.13	71.72	130.10	80.94	126.53	77.86	132.33	82.17
Non-HTN	114.08	70.78	125.94	79.63	122.10	76.18	127.54	80.39
HTN	128.23	75.14	145.30	85.72	142.67	84.00	149.79	88.63
Difference	-14.16	-4.36	-19.37	-6.09	-20.57	-7.82	-22.25	-8.23

Table 44 – This table shows the mean BP readings in all hypertensive and non-hypertensive participants , in hypertensive participants on AOBP mean SBP is 142.67 and mean DBP is 84, but in non hypertensive population on AOBP mean SBP is 122.10 and mean DBP is 76.18.

So in hypertensive and non hypertensive patients on AOBP difference for mean SBP is 20.57 and difference for mean DBP is 7.82.

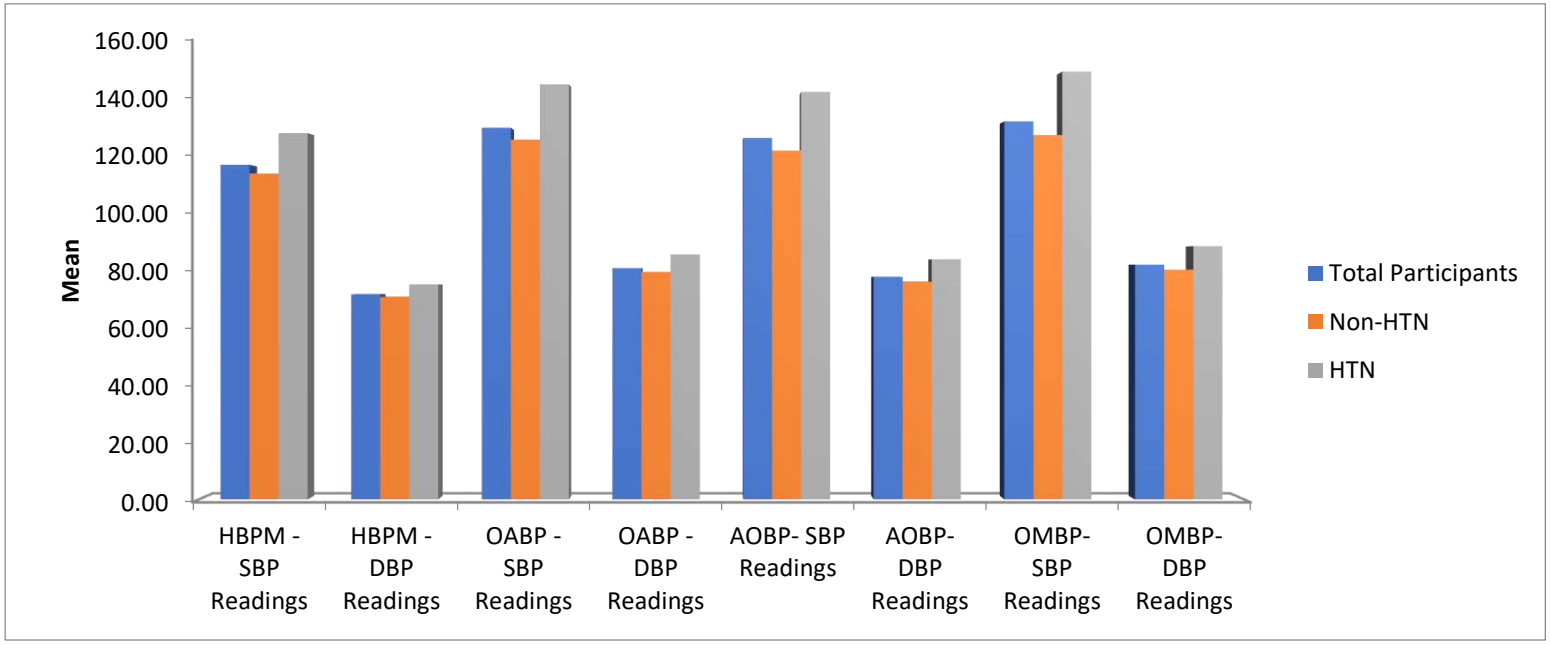

Figure 44 – This figure showes presentaion of mean BP readings with differents apparatus in all hypertensive and non hypertensive participants

Application of European guidelines for Hypertension in study (Watch BP home A apparatus in home BP readings) HBPM Readings

Distribution of participants according to BP readings in European hypertension guidelines.

HBPM SBP readings

HBPM SBP READINGS	No. of cases	Percentage
< 120	128	64.0%
121-129	45	22.5%
130-139	23	11.5%
140-149	4	2.0%
150-159	0	0.0%
160-179	0	0.0%
> 180	0	0.0%
Total	200	100.0%

Table 45 - This table show the SBP readings of all participants on HBPM.

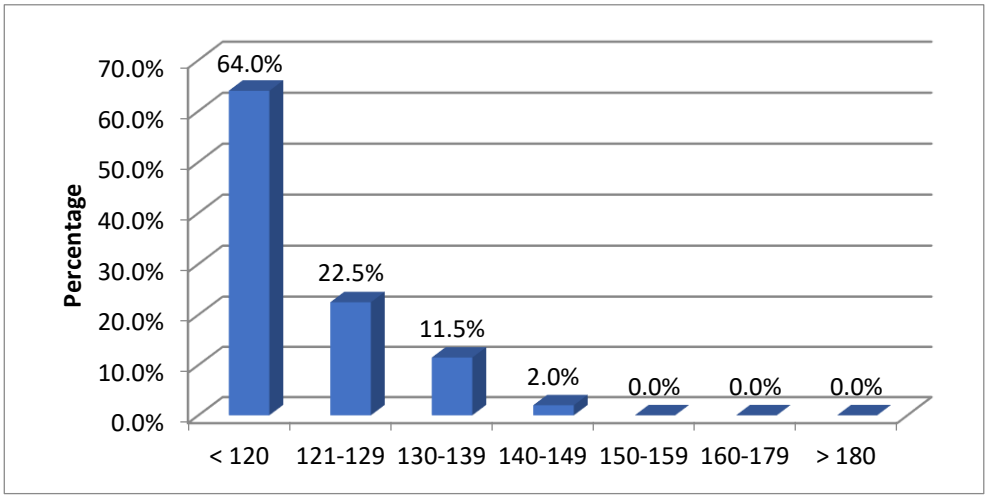

Figure 45 – This figure showes the precent distrubution of SBP readings on HBPM..

Application of European guidelines for Hypertension in study (Watch BP home A apparatus in home BP readings)HBPM Readings

Distribution of participants according to BP readings in European hypertension guidelines.

HBPM DBP readings

HBPM DBP Readings	No. of cases	Percentage
< 80	172	86.0%
80-84	25	12.5%
85-89	3	1.5%
90-99	0	0.0%
100-109	0	0.0%
> 110	0	0.0%
Total	200	100.0%

Table 46 **-** This table shows the DBP readings of all participants on HBPM taken at home by participants

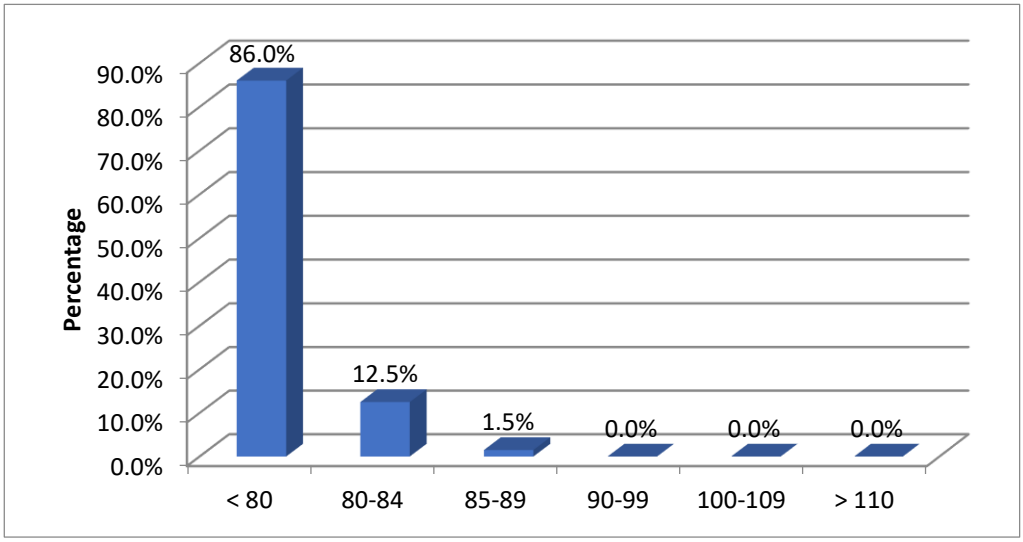

Figure 46 – This figure showes the precent distrubution of DBP readings on HBPM by participants at home.

Application of European guidelines for Hypertension in study Watch BP Home A (Digital) apparatus in home BP readings) HBPM Readings

Distribution of participants according to euorpean hypertension guidelines.

HBPM Readings	No. of cases	Percentage
Optimal	85	42.5%
Normal	15	7.5%
High Normal	45	22.5%
Grade I HTN	53	26.5%
Grade II HTN	2	1.0%
Total	200	100.0%

Table 47 – This table shows the distribution of participants according to European hypertension guidelines in HBPM readings.

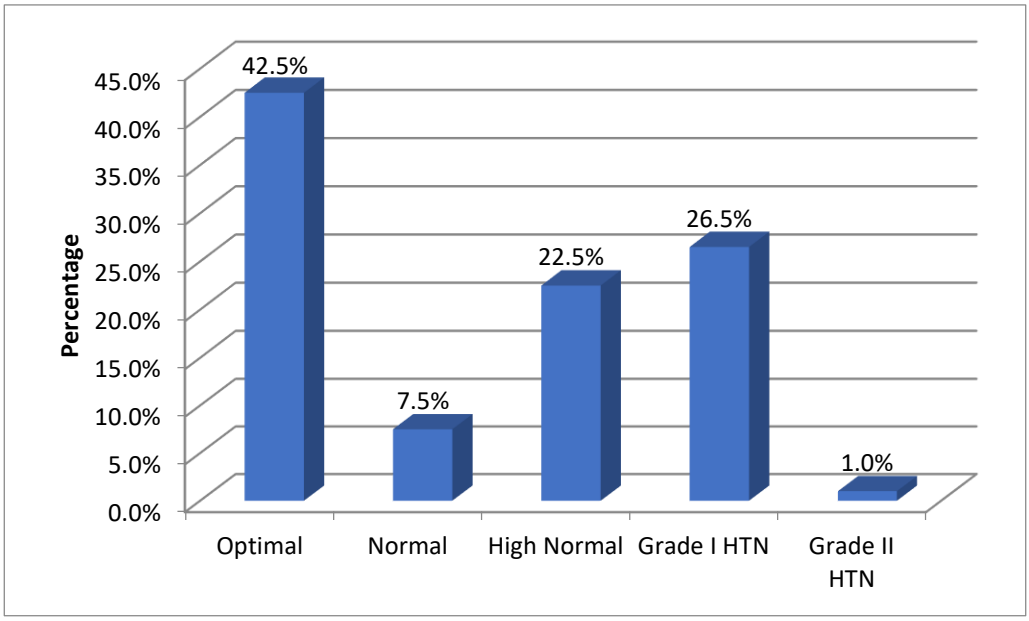

Figure 47 - This figure shows the distribution of participants according to European hypertension guidelines in HBPM readings.

(Application of European guidelines for Hypertension in study) OABP(Office Automatic BP readings on Watch BP home A (Microlife)

Distribution of participants according to BP readings in European hypertension guidelines.

Watch BP home A Apparatus in OFFICE

OABP SBP readings

OABP SBP Readings	No. of cases	Percentage
< 120	38	19.0%
121-129	74	37.0%
130-139	46	23.0%
140-149	28	14.0%
150-159	9	4.5%
160-179	5	2.5%
> 180	0	0.0%
Total	200	100.0%

Table 48 - This table shows the SBP readings of all participants on OABP.

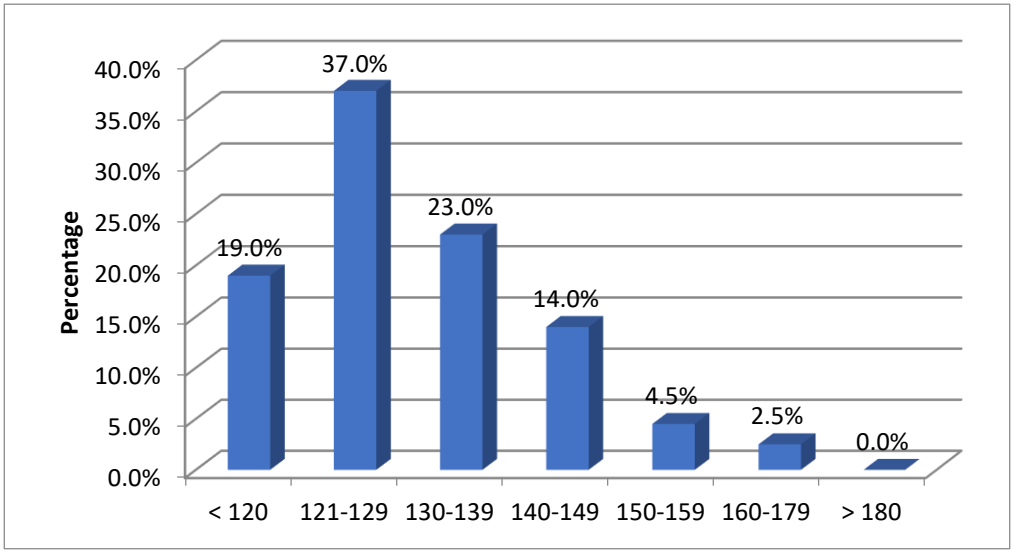

Figure 48 – This figure shows the SBP readings of all participants on OABP,.

Application of European guidelines for Hypertension in study

OABP(Office Automatic BP readings on Watch BP home A (Microlife)

Distribution of participants according to BP readings in European hypertension guidelines.

OABP DBP readings

OABP-DIASTOLIC BP Readings	No. of cases	Percentage
< 80	94	47.0%
80-84	52	26.0%
85-89	25	12.5%
90-99	25	12.5%
100-109	3	1.5%
>110	1	0.5%
Total	200	100.0%

Table 49 – This table shows the DBP readings of all participants on OABP.

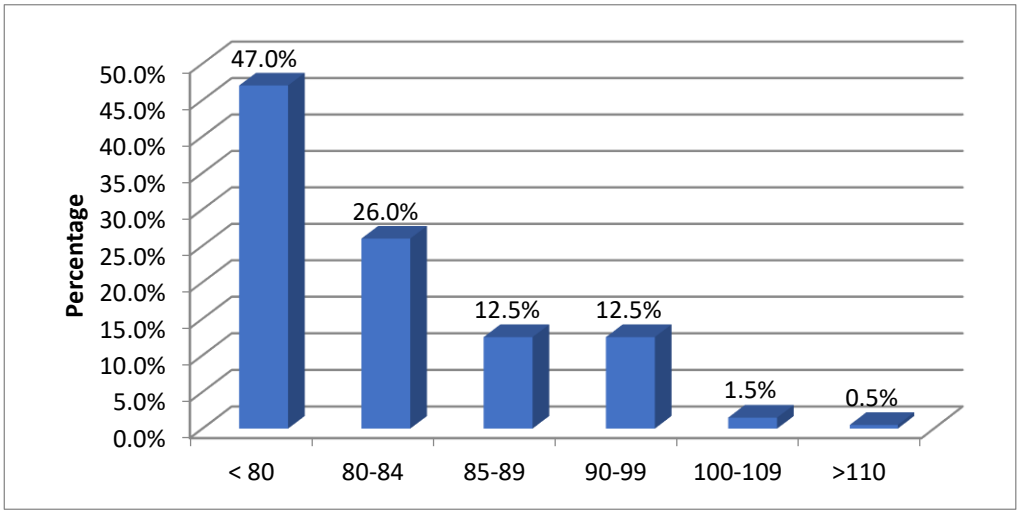

Figure 49 – This table shows the DBP readings of all participants on OABP.

Application of European guidelines for Hypertension in study

Application of European guidelines for Hypertension in study OABP readings

Distribution of participants according to European hypertension guidelines.

OABP BP	No. of cases	Percentage
Optimal	27	13.5%
Normal	74	37.0%
High Normal	46	23.0%
Grade I HTN	44	22.0%
Grade II HTN	8	4.0%
Grade III HTN	1	0.5%
Total	200	100.0%

Table 50 – This table shows the distribution of participants according to European hypertension guidelines to OABP readings.

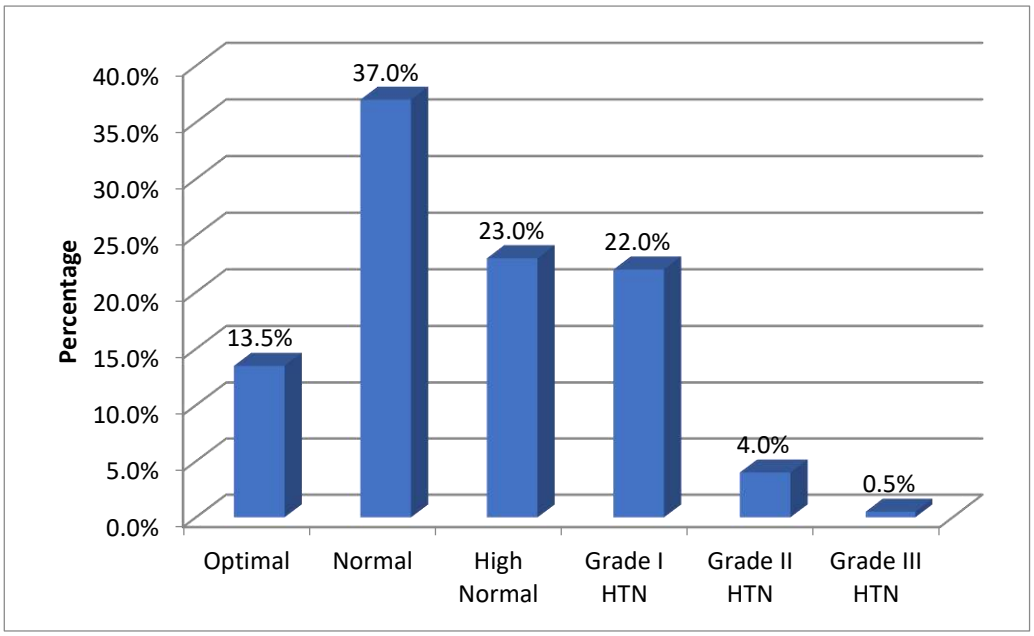

Figure 50 - This table shows the distribution of participants according to European hypertension guidelines to OABP readings.

Application of European guidelines for Hypertension in study

Distribution of participants according to BP readings in European hypertension guidelines.(Automated office BP Monitor) readings

AOBP SBP readings

AOBP BP-SYSTOLIC	No. of cases	Percentage
< 120	68	34.0%
121-129	61	30.5%
130-139	43	21.5%
140-149	19	9.5%
150-159	4	2.0%
160-179	5	2.5%
> 180	0	0.0%
Total	200	100.0%

Table 51 - This table shows the SBP readings of all participants on AOBP.

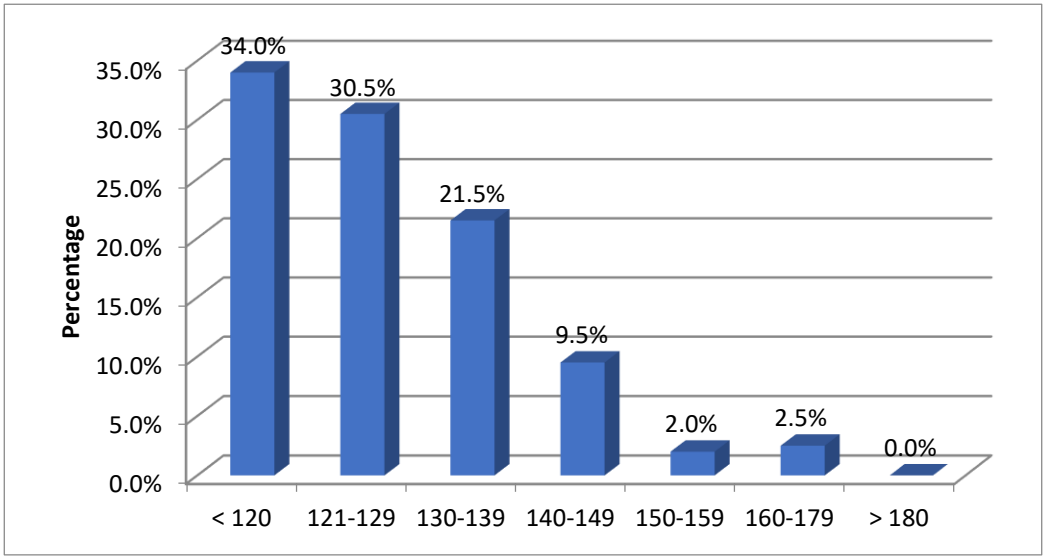

Figure 51 – This figure showes the precent distrubution of SBP readings on AOBP.

Application of European guidelines for Hypertension in study

Distribution of participants according to BP readings in European hypertension guidelines.

AOBP DBP readings

AOBP BP-DIASTOLIC	No. of cases	Percentage
< 80	126	63.0%
80-84	34	17.0%
85-89	22	11.0%
90-99	17	8.5%
100-109	1	0.5%
>110	0	0.0%
Total	200	100.0%

Table 52- This table shows the DBP readings of all participants on AOBP.

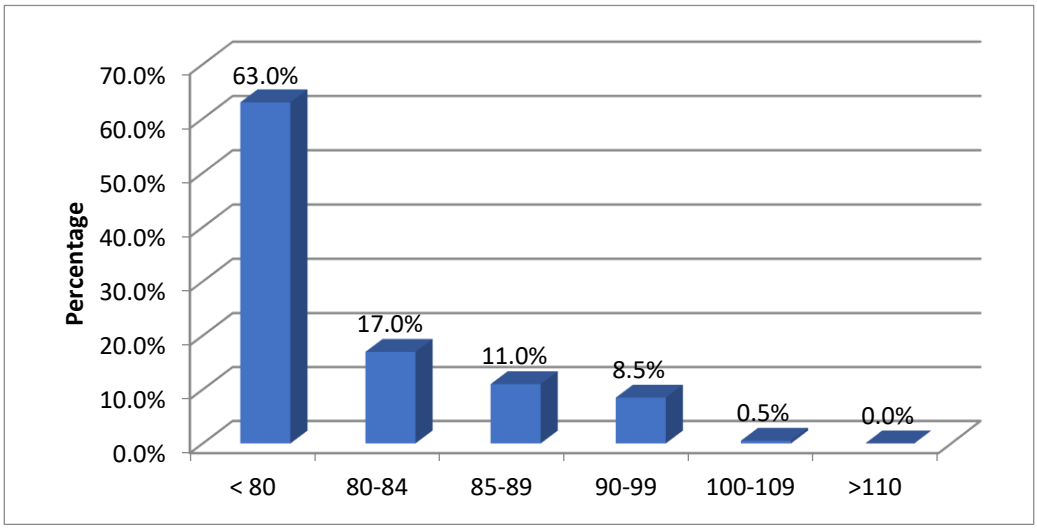

Figure 52 – This figure showes the precent distrubution of DBP readings on AOBP taken in offices.

Application of European guidelines for Hypertension in study

Distribution of participants according to European hypertension guidelines.(Automated Office BP monitor (AOBP) readings.

AOBP	No. of cases	Percentage
Optimal	56	28.0%
Normal	67	33.5%
High Normal	41	20.5%
Grade I HTN	30	15.0%
Grade II HTN	6	3.0%
Total	200	100.0%

Table 53 – This table shows the distribution of participants according to European hypertension guidelines when BP readings taken on AOBP .

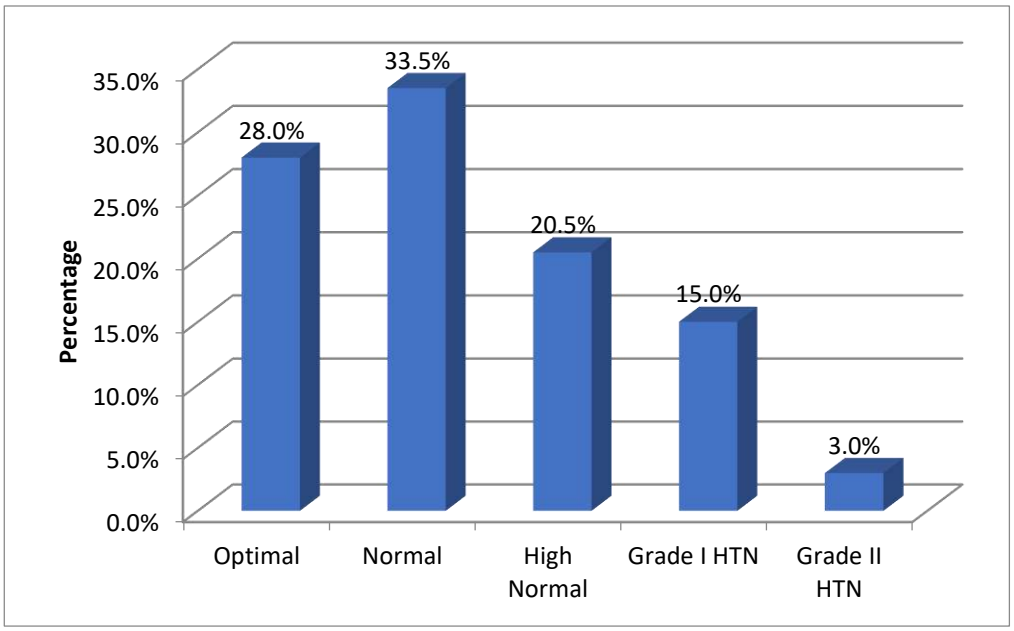

Figure 53 - This figure shows the distribution of participants according to European hypertension guidelines when BP readings taken on AOBP.

Application of European guidelines for Hypertension in study

Distribution of participants according to European hypertension guidelines.OMBP(Manual /Aneroid readings) in office by participants SBP readings

OMBP SBP Readings

OMBP-SBP readings	No. of cases	Percentage
< 120	50	25.0%
121-129	24	12.0%
130-139	63	31.5%
140-149	30	15.0%
150-159	23	11.5%
160-179	10	5.0%
>180	0	0.0%
Total	200	100.0%

Table 54 - This table shows the SBP readings of all participants taken with manual apparatus by observer.

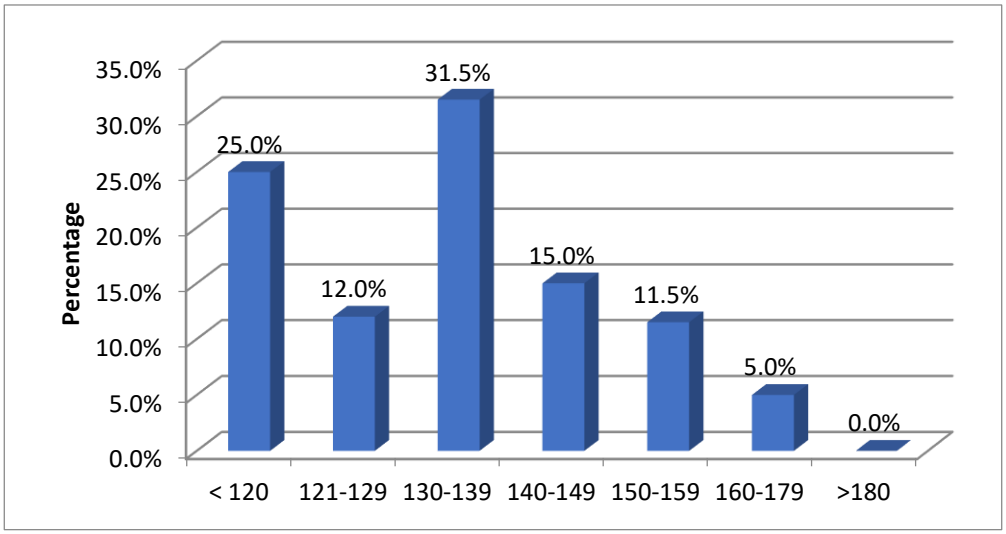

Figure 54 – This figure showes the precent distrubution of SBP readings on manual apparatus taken in office by observer.

Application of European guidelines for Hypertension in study

Distribution of participants according to BP readings in European hypertension guidelines- OMBP (Office manual BP readings taken by observer)

OMBP DBP readings

OMBP-DBP Readings	No. of cases	Percentage
< 80	52	26.0%
80-84	93	46.5%
85-89	16	8.0%
90-99	32	16.0%
100-109	5	2.5%
> 110	2	1.0%
Total	200	100.0%

Table 55 - This table shows the DBP readings of all participants taken by manual apparatus by observer.

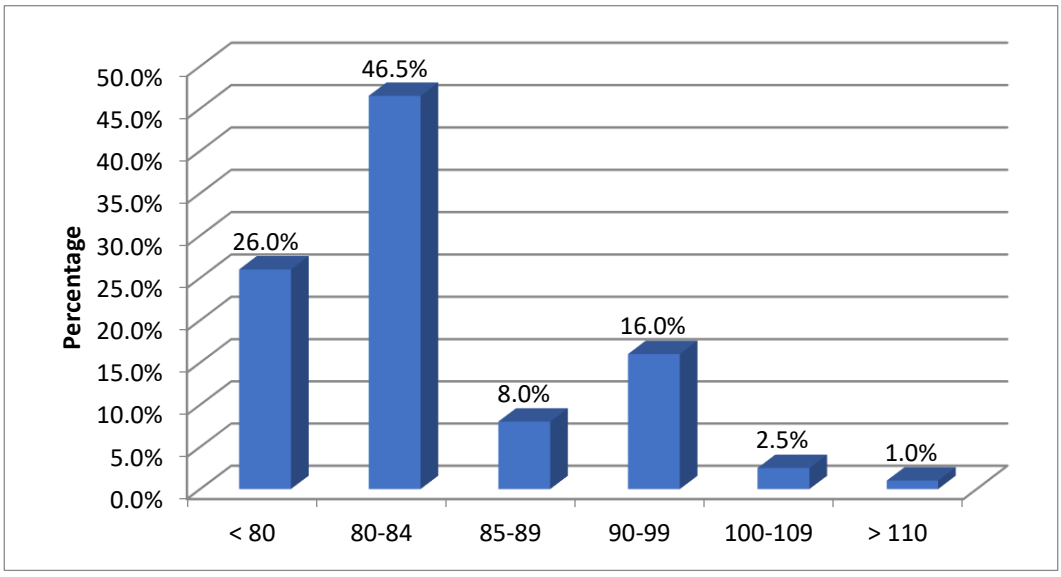

Figure 55 – This figure showes the precent distrubution of DBP readings on manual apparatus taken in office by observer.

Application of European guidelines for Hypertension in study

Distribution of participants according to European hypertension guidelines in Office manual BP readings(OMBP)

OMBP BP readings	No. of cases	Percentage
Optimal	23	11.5%
Normal	41	20.5%
High Normal	61	30.5%
Grade I HTN	60	30.0%
Grade II HTN	13	6.5%
Grade III HTN	2	1.0%
Total	200	100.0%

Table 56 – This table shows the distribution of participants according to European hypertension guidelines when BP readings taken on OMBP.

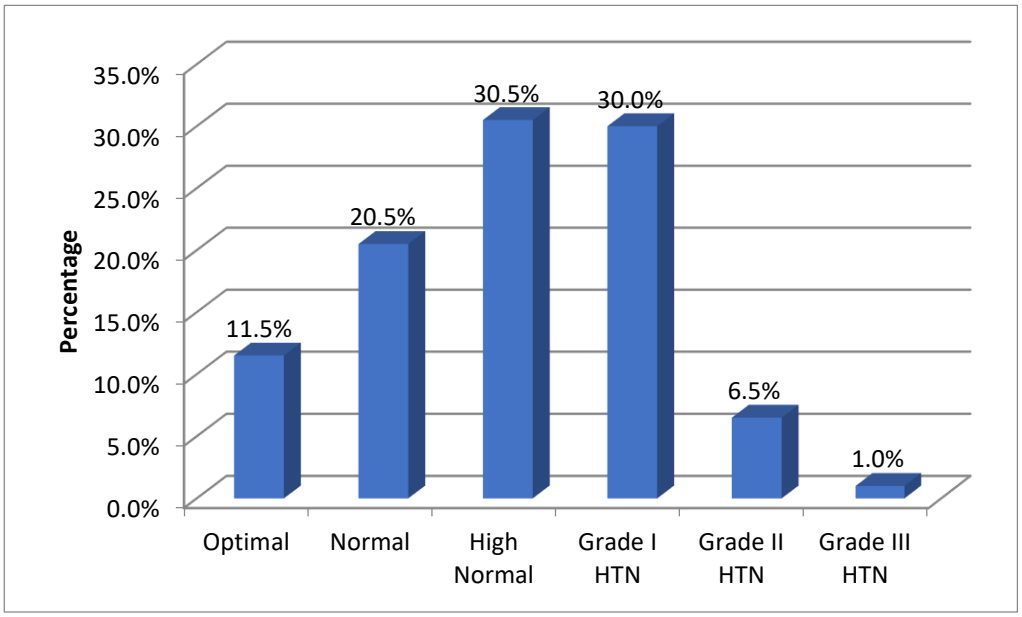

Figure 56- This figure shows the distribution of participants according to European hypertension guidelines when BP readings taken on OMBP.

Value of Total Cholestrol in Hypertensive participants.

Total Cholesterol	No. of cases	Percentage
< 150	15	21.1%
150-200	38	53.5%
> 200	18	25.4%
Total	71	100.0%

Table 57 - This table shows the Value of Total Cholestrol in Hypertensive participants total cholesterol level in participants .

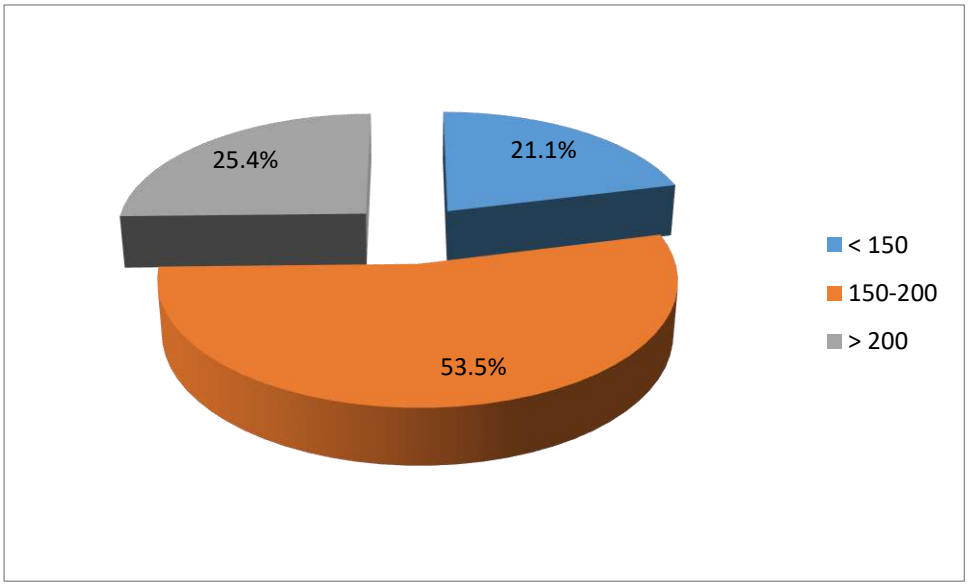

Figure 57 - This figure shows Value of Total Cholestrol in Hypertensive participants.

Serum Potasium levels in Hypertensive participants.

Potassium	No. of cases	Percentage
< 2.5		0.0%
2.5-3.5	22	28.9%
> 3.5	54	71.1%
Total	76	100.0%

Table 58 – This table shows potassium level in hypertensive in hypertensive participants.

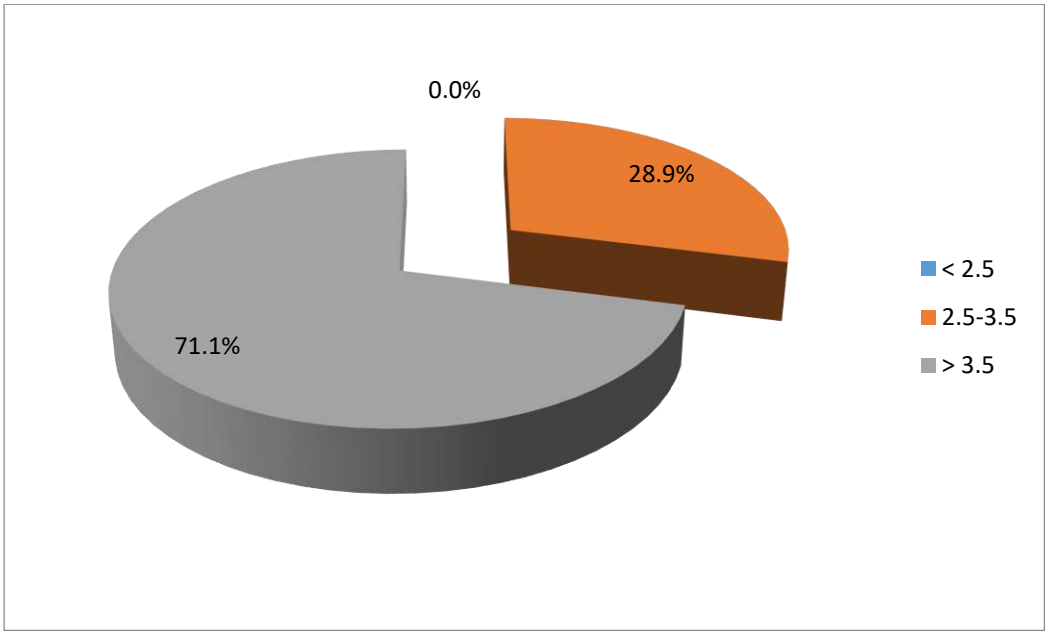

Figure 58 - This figure shows potassium level in hypertensive in hypertensive participants.

Distrubution of sodium level in hypertensive participants.

Sodium	No. of cases	Percentage
< 125	0	0.0%
125-135	13	17.1%
> 135	63	82.9%
Total	76	100.0%

Table 59 - This table shows showes the precent distribution of serum sodium levels in hypertensive parrticipents

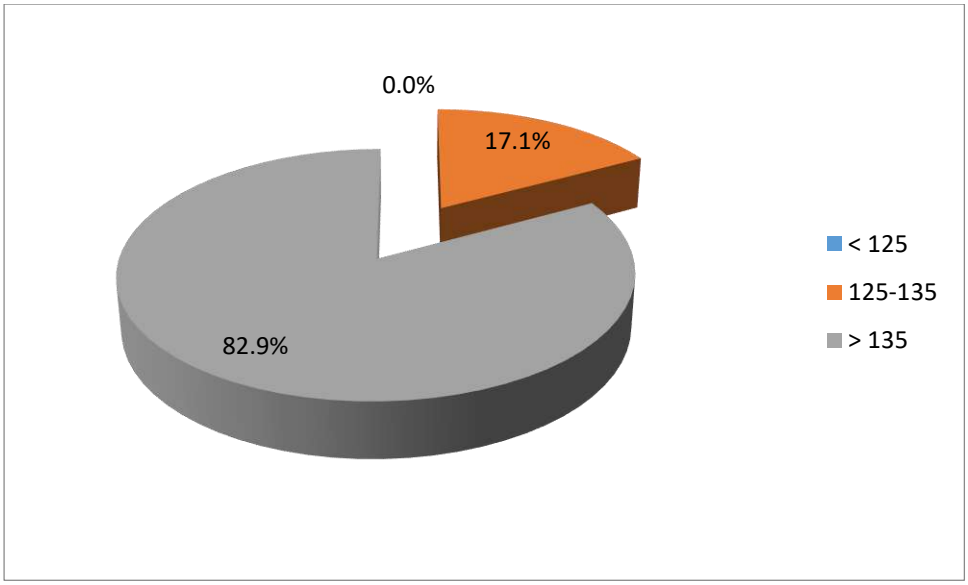

Figure 59 - This figure showes the precent distribution of serum sodium levels in hypertensive parrticipents.

Distrubution of ecg changesin all participants

ECG	No. of cases	Percentage
LVH	10	5.0%
N-NO LVH	190	95.0%
Total	200	100.0%

Table 60 - This table shows ECG findings in all participants.

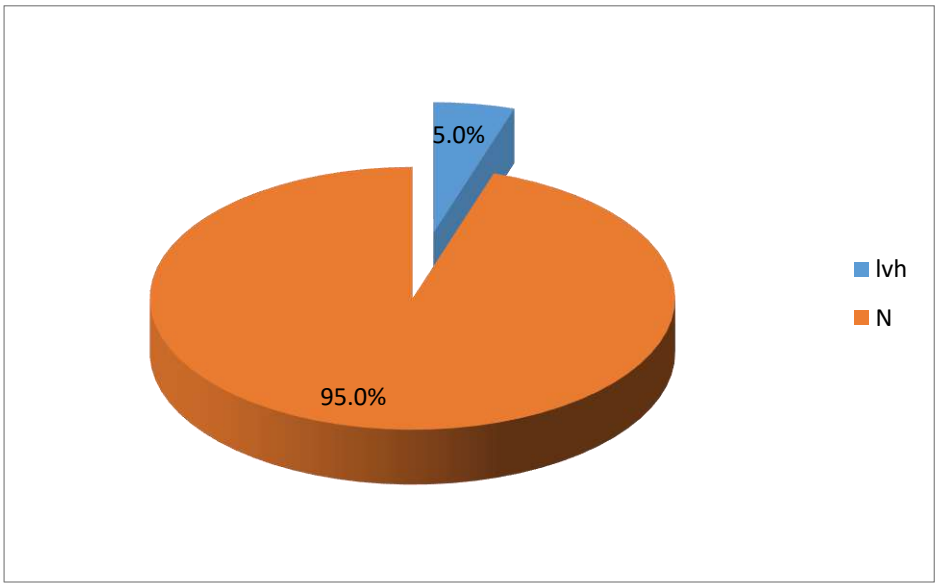

Figure 60 - This figure shows ECG findings in all participants.

DISCUSSION

Measurement of blood pressure (BP) using the auscultatory method must follow specific rules and conditions to be reliable. Nonetheless, these requirements are often not followed in clinical practice, resulting in inaccurate BP readings. Simply replacing manual sphygmomanometers with an oscillometric device may still produce readings that are associated with a white coat effect. These limitations can be overcome by using an oscillometric sphygmomanometer that Oscillometric (Digital) digitally records multiple readings with the patient resting quietly and alone, called automated office (AO)BP. AOBP produces office readings with a reduced white coat effect, which are also similar to the awake ambulatory BP. There is also evidence that AOBP is a better predictor of target organ damage than attended office BP. Furthermore, clinical outcome data support AOBP as having both a similar diagnostic threshold as awake ambulatory BP and a lower treatment target. Using AOBP in clinical practice simplifies recording office BP by not requiring an additional period of rest before activation of the device and by not having staff present during the actual measurements. Recent studies have reported that Oscillometric (Digital) BP measurements taken by staff in research studies with close adherence to guidelines using AOBP devices may produce similar readings to AOBP.[38]

In this study ,BP readings of 200 participants first taken at home on Oscillometric (Digital) automatic apparatus that is Watch BP home A (Microlife) these BP readings label as home BP monitor readings (HBPM) , than readings taken in office with same Oscillometric (Digital) automatic Apparatus in office these BP readings label as office automatic BP readings (OABP). After it BP readings of participants taken with Automated Office BB Apparatus that is Watch BP Office(Microlife) in the absence of observer these BP readings assign as Automated office BP readings (AOBP) and BP readings taken with Manual(Aneroid) apparatus by observer these readings label as office manual BP readings(OMBP). So there are four different Blood pressure readings

AOBP(Automated Office BP)-BP readings with automated office bp Apparatus in the absence of observer

OMBP(Office Manual BP)-BP readings with manual apparatus by observer in office

OABP(Office Automatic BP)- BP readings with digital (Watch BP home A (Microlife) in office

HBPM (Home BP measurement)- BP readings with digital (Watch BP home A (Microlife) at home by participant

Comparison of BP readings of different apparatus done by pairing the reading by following way.

(A) Comparison of average bp readings of AOBP(Automated Office BP Apparatus readings) with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

(B) Comparison of average of office Manual bp readings (OMBP) taken with manual apparatus by observer With Automated Office BP apparatus (AOBP) bp readings in all participants

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP measurements (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP measurements (HBPM)(BP readings taken with digital (Watch BP home A ,Microlife)at home by all participant

(E) Comparison of average office Manual BP readings (OMBP) with with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

(A) Comparison of average bp readings of AOBP(Automated Office BP Apparatus readings) with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

Following results are obtained after comparing the BP reading taken in office by AOBP and reading of BP on Watch BP home A (Microlife) apparatus in office .

Systolic BP

Readings of SBP are decreased with AOBP when compared to the average reading of SBP measured on OABP (Watch BP home A (Microlife)) apparatus in office in 152(76%) participants. There is

decrease in BP >5mm hg in 48(24%) participants and decrease in reading between 0-5 mm hg in 104(52%) participants.

Increase in SBP readings with AOBP in only in 44(22%) participants and in 4(2%) participants no variation in readings. Gender analysis shows that increase in reading in female hypertensive participants more as compare to male and non hypertensive female.

Mean of SBP readings of all participants OABP is 130.10±11.44 mm hg (on **Watch BP home A (Microlife)** apparatus in office and mean of average BP readings of AOBP apparatus taken in office is 126.53±12.02 mm hg , so difference of both mean value is for systolic BP is 3.57±6.51mm hg ($p<0.001$)

Diastolic BP

Readings of diastolic BP taken with AOBP In office is low in 129(64.5%) participants when compare to average OABP readings taken with Watch BP home A (Microlife)) apparatus in office .Decrease in DBP reading >5 mm hg in 34(17%) participants and decrease in readings between 0-5 mm hg on AOBP in 95 (47.5%) participants.

Mean of readings of DBP on OABP(**Watch BP home A (Microlife)** apparatus in office for all particpents is 80.94±7.93 mm hg and on AOBP apparatus is 77.86±8.24 mm hg,difference between two mean value is 3.08±6.52($p<0.001$)

(B) Comparison of average of office Manual bp readings (OMBP) With Automated Office BP Apparatus (AOBP) BP readings in all participants

Following results are obtained after analysis of Aneroid and AOBP readings taken in office

Systolic BP

Systolic blood pressure reading on Aneroid are high in 159(79.5%) participants when taken in office by observer compare with readings taken with AOBP in office .Increase in reading >10 mm hg in 48(24%) participants, increase between 5-10mm hg in 57(28.5%) participants and increase in reading between 0-5mm of hg in 54(27.%) participants.

Mean of systolic BP readings of all participants is 126.53±12.02 mm hg with AOBP and mean of all aneroid readings is 132.33±13.08 mm hg, difference of both mean value is 5.8±8.39 mm hg($p<0.001$).

Diastolic BP

Diastolic blood pressure readings on manual apparatus are high in 139 (69.5%) participants when compare with AOBP readings taken in office. Increase in reading in >10 mm hg in 38(19%)participants ,increase between 5-10mm hg in 44(422%) participants and increases in reading between 0-5mm hg in 57 (28.5%) participants.

Mean of diastolic BP readings of all participants is 77.86±8.24 mm hg with AOBP and mean of aneroid readings is 82.17±7.52 mm hg with manual apparatus in office, difference of two mean value is 4.31±7.37 mm hg ($p<0.001$)

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP measurements (HBPM)(BP readings taken with digital (Watch BP home A, Microlife)at home by all participants.

Following results obtained after comparison of AOBP and HBPM readings

Systolic BP

SBP readings in 187(93.5%) participants increased when AOBP compared with HBPM, increase in readings >10 mm hg in 66(33%) participants increase in readings 10- 5mm hg in 108 (54%) and increase in value between 0-5% in 13(6.5%) participants.

decrease reading noted in 11(5.5%) participants when HBPM compared with AOBP, no change in3(1.5%) participants.

Mean SBP on HBPM 117±9.49 mm hg and mean SBP on AOBP is 126.63±12.02 mmhg. Difference of mean is 9.40±6.20 mm hg (p-0.000).So on HBPM mean SBP readings are approximate 9.40 mm hg higher than AOBP.

Dystolic BP

DBP readings increased in 185(92.5%) participants when AOBP compared with HBPM. Increase in SBP readings by >10mm hg in 26(13%) participants and increase in reading 10-5 mm of hg in 90(45%) and decrease between 0-5mm hg in 69(34.5%) participants.

.Mean DBP on HBPM is 71.72±6.05mm hg and mean DBP on AOBP is 77.86±8.24 mm hg ,difference in mean DBP value is6.15+-4.84 mm hg

(p<0.01),So in significant no of participants has lower mean DBP reading on HBPM compared to AOBP

So there is decrease in mean SBP and mean DBP on HBPM in compared to AOBP.

(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP measurements (HBPM) (BP readings taken with digital (Watch BP home A, Microlife) at home by all participant.

SYSTOLIC BP

Systolic BP readings are increased on aneroid (OMBP) as compare to average reading on Watch BP Home Amicrolofe at home(HBPM) in 185(92.5%) participants. Increase in value >10mm of hg in 147(73.5%) and increase in value 10-5 mm of hg in 24(12%) and 0-5mm hg in 14(7%) participants.

Decrease in SBP on HBPM compare to OMBP bp only in 13 (6.5%) in insignificant number of participants, no change in2 (1%) participants.

Mean SBP of all participants on HBPM is 117±13 mm hg and on OMBP is 132.33±13.08,difference between mean is 15.20±9.80 mm hg (p<0.001).

DYSTOLIC BP

On aneroid (manual) apparatus (that is OMBP) increase in reading in 183(91.5%) compare to average bp readings on Watch Bp home A, Microlife(that is HBPM) at home. Increase in readings >10 mm of hg in 96(48%) increase in value 10-5 mmhg 57(28.5%) and 0-5 mm hg 30(15%) participants.

Maen DBP on HBPM is 71.72±7.45 mm of hg and on OMBP is 82.17±7.52, difference between home is 10.45±7.54.(P<0.001)

So there is decrease in mean SBP and mean DBP on HBPM in compared to OMBP.

(E) **Comparison of average office Manual BP readings (OMBP) with with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.**

Following results are obtained after comparing the OMBP (manual(Aneroid) readings taken in office by observer with average readings of OABP on (Watch BP home A (Microlife) apparatus in office

Systolic BP

On OMBP (Office manual BP) check up 124(62%) participants has increase in SBP readings when taken by observer in office compare with OABP (Watch BP home A (Microlife) apparatus) , increase in BP readings >10mm hg in 21(10.5%), between 5-10mm hg in 50(25%) participants and 0-5 mm hg rise in 53(26.5%) participants.

Mean of systolic BP readings on OABP (Watch BP home A (Microlife) apparatus) in office is 130.10±11.44 mmhg, and on manual (aneroid) is 132.33±13.08 mm hg , difference in two mean value is 2.22± 7.96mm hg ($p<0.001$).

Diastolic BP

Diastolic BP readings on OMBP (office manual (Aneriod) apparatus) are high in113(56.5%) participants when compare with OABP (Watch BP home A (Microlife) apparatus) increase in BP reading >10 mm hg in 14(7%) participants, between 10-5 mm hg in 47(23.5%) participants and increase between 0-5 mm hg in 52(26%) participants

Decrease in DBP readings in 78(39%) participants , no variation in 9(4.5%) participants .

Mean of DBP readings OABP(taken with **Watch BP home A (Microlife)** apparatus in office is 80.94+_ 7.93 mm hg and on mean of OMBP (office manual (Aneroid) readings is 82.17+_7.52 .Difference between two mean value is 1.23+_7.90 (p-0.029)

Manual blood pressure (BP) is gradually disappearing from clinical practice with the mercury sphygmomanometer now considered to be an environmental hazard. Manual BP is also subject to measurement error on the part of the physician/nurse and patient-related anxiety which can result in poor quality BP measurements and office-induced (white coat) hypertension. Automated office (AO) BP with devices such as the BpTRU (BpTRU Medical Devices, Coquitlam, BC) has already replaced conventional manual BP in many primary care practices in Canada and has also attracted interest in other countries where research studies using AOBP have been undertaken. The basic principles of AOBP include multiple readings taken with a fully automated recorder with the patient resting alone in a quiet room.. AOBP also simplifies the definition of hypertension in that the cut point for a normal AOBP (< 135/85 mm Hg) is the same as for the awake ambulatory BP and home BP. 24 The

advent of automated office BP (AOBP) represents a third alternative to conventional manual BP measurement, one that maintains the role of office BP readings in the diagnosis and management of hypertension. AOBP has three basic principles: multiple readings taken using a fully automated sphygmomanometer with the patient resting quietly alone. AOBP eliminates office-induced hypertension such that the cut-point for a normal AOBP is the same as for the awake ambulatory BP and home BP. As compared to routine manual office BP, AOBP provides more accurate BP readings, is more consistent during repeated office visits and in different settings and correlates better with both the awake ambulatory BP and target organ damage. The advantages of AOBP over manual BP measurement support its use in routine clinical practice.[26]

Previous study done by Andreadis et al [23] in 2012 using office BP (microlife watch BP office) to compare the quality and accuracy of morning blood pressure (BP) readings as taken by automated office BP (AOBP) and morning home BP (mHBP) The AOBP values were slightly higher than the mABP3h (mean difference 8.2 mmHg, 95% limits of agreement, -18.8 to 35.2 mmHg for the systolic BP and mean difference 4.3 mmHg, 95% limits of agreement, -15.3 to 23.9 mmHg for the diastolic BP). Systolic and diastolic AOBP readings correlated with mABP3h (r=0.66, P=0.001 and r=0.64, P=0.001, respectively) which is similar to our study.

In previous study by Wohlfahrt et al[29] concluded that Manual SBP (mean difference 6.39 ± 9.76 mmHg) and DBP (mean difference 2.50 ± 6.54 mmHg) were higher than the automated BP. In there study AOBP of 131/85 mmHg corresponded to the manual BP of 140/90 mmHg. These findings are matching the comparison of our study.

In previous study by Refrit et al[32] in which two hundred eighty-eight patients were included in the clinical cohort, and 195 patients contributed to research-grade BP data. All patients had hypertension. AOBP averages were lower than manual measurement averages in both clinical (-3.6 ± 14.9 mm Hg / -3.0 ± 8.8 mm Hg) and research (-2.7 ± 10.0 / -2.4 ± 6.3 mm Hg) environments. Manual BP readings were slightly higher than AOBP estimates. These results showed similar pattern as in our study.

In previous study dy Filipovsky et al [35], D'Sa et al[37] showed that manual BP readings are higher than automated office Bp apparatus readings. Similar results are obtained in our study.

SUMMARY & CONCLUSIONS

SUMMARY

- In this study ,BP readings of 200 participants taken ,out of total 200 participants 136 are male and 64 are female.
- Age of participants involved in this study is from 20years to 60 years. Age group between 20-30 years has 58 participants, between 31-40 years has 77 participants, between 41-50 years has 38 participants and between 51-60 years has 27 participants.
- Person normotensive or hypertensive stage-1 included in study, and participants those are in hypertensive stage 2 and 3 those are stable on treatment since one month included in study.
- 43(21.5%) participants were hypertensive stable on treatment and 157(78.5%) are non hypertensive, total 200 participants included in study.
- Persons those have arrhythmia, on irregular treatment are excluded from study.
- All included participants BP readings taken initially on Oscillometric (Watch BP home A) Apparatus at home label as HBPM under standardized conditions and then readings taken in office with same Apparatus label as OABP. After that BP readings taken with Automated Office BP Apparatus (Watch BP Office, microlife} (in the absence of observer) that is AOBP and with Manual(Aneroid) apparatus by observer that is OMBP.

Table- 61. Comparison of mean BP readings done by different methods in all participants described here

	Mean SBP Readings	Mean DBP Readings
HBPM	117.13	71.72
AOBP	126.53	77.86
OABP	130.10	80.94
OMBP	132.33	82.17

Comparison of BP readings of different apparatus done by pairing the readings by following way.

(A) Comparison of average bp readings of AOBP(Automated Office BP Apparatus readings) with OABP(Office Automatic BP readings on Watch BP home A (Microlife)) all participants.

(B) Comparison of average of office Manual bp readings (OMBP) taken with manual apparatus by observer With Automated Office BP apparatus (AOBP) bp readings in all participants

(C) Comparison of average of Automated Office BP Apparatus readings (AOBP) BP readings in office with home BP monitoring (HBPM) (BP readings taken with digital (Watch BP home A ,Microlife) at home by all participant

(D) Comparison of Office Manual BP (OMBP) BP taken on (Aneroid) apparatus in office with home BP monitoring (HBPM) (BP readings taken with digital (Watch BP home A ,Microlife) at home by all participant

(E) Comparison of average office Manual BP readings (OMBP) with with OABP (Office Automatic BP readings on Watch BP home A (Microlife)) in all participants.

(OMBP vs AOBP BP Readings)

- In this study mean of SBP reading of all participants on Aneroid manual apparatus is 132.33 ± 13.08 mm hg and on AOBP mean

of SBP readings is 126.53 ± 12.02 mm hg (difference between two mean readings is 5.8 ± 8.39 mm hg) mean of DBP readings on aneroid Manual is 82.17 ± 7.52 mm hg and on AOBP is 77.86 ± 8.24 mm hg (difference between mean two readings is 4.31 ± 7.37 mm hg), ($p<0.001$)

- So mean readings take on OMBP are approximately 5.80± 8.39 mm hg and 4.31±7.37 mm hg are higher than AOBP readings for SBP and DBP respectively,
- This increase in mean BP readings on manual BP recording validate the effect of presence of observer at the time of recording of BP in office or clinic with manual apparatus.

(OABP vs AOBP BP Readings)

- In our study Mean of SBP readings of all participants is 130.10 ± 11.44 mmhg when BP reading taken on OABP and mean of average BP readings of AOBP apparatus taken in office is 126.53 ± 12.02 mm hg, so difference of both mean value is for systolic BP is 3.57± 6.51mm hg ($p<0.001$),
- So mean of SBP readings of all 200 participants on AOBP is 3.57 ±6.51 mm hg less than mean of SBP reading on OABP.
- Similarly mean of DBP readings of all 200 participants on AOBP is3.08± 6.52 mm hg less than mean of DBP readings on OABP.
- So mean SBP and DBP readings on AOBP are low compare to OABP , in significant no of participants with significant p value.

(HBPM vs AOBP BP readings)

- In our study mean of SBP readings on HBPM in all participants is 117± 13 mm hg and mean of SBP readings on AOBP when readings taken in the absence of observer is 126.53 ± 12.02 mm hg (difference between two readings is 9.40 ± 6.20 mm hg ($p<0.001$)),
- So on HBPM readings for SBP 9.4 ± 6.20 mm hg lower than SBP readings on AOBP .
- Similarly HBPM readings 6.15 ± 4.84 mm hg lower for DBP than DBP readings on AOBP.

- So mean SBP and DBP readings onHBPM are lower than BP readings on AOBP, in significant no of participants with significant p value.

Table – 62. After application of European Hypertension Guidelines[4]to all BP readings in all participants in study following results obtained-

	OMBP	AOBP	HBPM	OABP
HTN Category	No. of Participants	No. of Participants	No. of Participants	No. of Participants
Optimal	23(11.5%)	56(28.0%)	85(42.5%)	27(13.5%)
Normal	41(20.5%)	67(33.5%)	15(7.5%)	74(37.0%)
High Normal	61(30.5%)	41(20.5%)	45(22.5%)	46(23.0%)
Grade I HTN	60(30.0%)	30(15.0%)	53(26.5%)	44(22.0%)
Grade II HTN	13(6.5%)	6(3.0%)	2(1.0%)	8(4.0%)
Grade III HTN	2(1.0%)	0(0%)	0(0%)	1(0.5%)
Total	200(100%)	200(100%)	200(100%)	200(100%)

Table – 63. After application of European Hypertension Guidelines[4]to all BP readings in previous non- hypertensive participants in study following results obtained-

	OMBP	AOBP	HBPM	OABP
HTN Category	No. of Participants	No. of Participants	No. of Participants	No. of Participants
Optimal	23(15%)	56(36%)	83(53%)	27(17%)
Normal	41(26%)	65(41%)	8(5%)	74(47%)
High Normal	60(38)	26(17%)	25(16%)	38(24%)
Grade I HTN	33(21%)	9(6%)	41(26%)	17(11%)
Grade II HTN	0(0%)	1(1%)	0(0%)	1(1%)
Grade III HTN	0(0%)	0(0%)	0(0%)	0(0%)
Total	157(100%)	157(100%)	157(100%)	157(100%)

- After application of European hypertension guidelines in all 200 participants, it is observed that when BP readings taken with Manual (Aneroid) apparatus by observer in office 60(30%) participants included in grade 1 hypertension category But on AOBP only 30(15%) participants has grade 1 hypertension.
- After application of European hypertension guidelines in all 200 participants, it is observed that when BP readings taken with OABP 44(22%) participants included in grade 1 hypertension category But on AOBP only 30(15%) participants has grade 1 hypertension.

CONCLUSION

In our study it is observed that readings taken on Office manual BP (OMBP) are 5.80+-8.39 mm hg and 4.31 ± 7.37 mm hg are higher than Automated office BP (AOBP) readings for SBP and DBP respectively and AOBP readings are 9.4±6.20 mm hg and 6.15±4.84 mm hg higher than Home BP measurements (HBPM) readings for SBP and DBP respectively.

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S.NO.	NAME	GENDER	AGE	AGE GROUP	HEIGHT	WEIGHT	ARM CIRUCUM FERENCE	HBPM SYSTOLIC	HBPM DIASTOLIC	HBPM PULSE	OABP SYSTOLIC	OABP DIASTOLIC	OABP PULSE	AOBP SYSTOLIC	AOBP DIASTOLIC	AOBP PULSE	OMBP SYSTOLIC	OMBP DIASTOLIC	OMBP PULSE	HTN	Duration of htn	DM	ECG	ECHO	TOTAL CHOLESTROL	POTASSIUM	SODIUM	CREATININE
1	SS	M	42	41-50	172	69	32	123	68	74	132	76	69	130	74	69	140	80	84	YES	5	NO	N	-	-	-	-	-
2	GK	M	55	51-60	168	75	27	104	72	71	135	88	73	110	76	75	116	74	80	NO		NO	N	-	145	3.6	132	1.2
3	JS	M	39	31-40	171	84	26	113	75	79	124	81	75	120	86	76	110	80	82	NO		NO	N	-	120	3.5	145	1
4	BS	M	38	31-40	173	78	32	122	77	63	134	89	73	135	84	75	140	80	73	YES	2	YES	N	-	-	-	-	-
5	DLS	M	45	41-50	164	80	32	117	66	56	131	70	62	125	69	68	130	78	82	NO		NO	N	-	-	-	-	-
6	PK	F	35	31-40	165	75	28	120	76	69	144	86	79	131	85	77	130	74	82	NO		NO	N	-	-	-	-	-
7	HS	M	26	20-30	194	82	29	101	66	62	118	69	65	111	70	60	122	74	69	NO		NO	N	-	-	4	135	0.9
8	KS	M	51	51-60	189	91	32	119	70	67	140	90	69	127	89	69	122	82	70	NO		NO	N	-	-	-	-	-
9	BGS	M	49	41-50	172	83	35	119	69	74	111	83	85	124	79	84	112	78	85	NO		NO	N	-	-	-	-	-
10	BK	F	45	41-50	152	70	30	110	53	76	124	72	64	117	56	68	152	86	84	NO		NO	N	-	145	4.2	137	1.1
11	GS	M	67	51-60	168	71	28	137	71	72	154	78	80	161	80	83	160	86	72	YES	12	NO	lvh	55LVH	185	3.5	142	0.98
12	KS	M	31	31-40	171	92	32	124	65	97	142	84	113	132	76	110	140	82	110	NO		NO	N	-	-	-	-	-
13	SA	F	25	20-30	159	69	29	109	67	74	119	81	74	116	82	72	120	80	74	NO		NO	N	-	133	3.7	135	1.1
14	SM	F	34	31-40	152	83	32	131	71	95	141	80	91	142	89	85	146	90	92	NO		NO	N	-	-	-	-	-
15	SRS	M	29	20-30	171	72	29	111	67	72	117	79	73	119	77	70	114	88	66	NO		NO	N	-	-	-	-	-
16	KK	F	45	41-50	156	53	22	124	63	71	135	72	74	131	67	73	130	70	78	NO		NO	N	-	-	-	-	-
17	AV	M	34	31-40	162	79	30	125	58	73	134	82	84	129	62	71	130	80	84	NO		NO	N	-	-	4.3	142	1
18	VC	M	48	41-50	159	82	29	121	69	73	128	83	66	131	83	65	130	82	67	NO		NO	N	-	-	-	-	-
19	RM	F	25	20-30	164	78	25	110	64	83	114	74	78	115	68	68	120	80	72	NO		NO	N	-	-	-	-	-
20	MS	M	29	20-30	170	78	24	121	71	80	134	84	84	127	76	82	140	84	86	NO		NO	N	-	-	-	-	-
21	MS	M	29	20-30	175	88	27	117	61	78	136	82	70	127	67	74	142	76	84	NO		NO	N	-	-	-	-	-
22	DS	M	35	31-40	168	64	27	107	70	73	118	75	78	113	75	74	118	76	85	NO		NO	N	-	-	-	-	-
23	RL	M	26	20-30	171	88	26	114	69	71	118	83	67	120	75	69	124	80	74	NO		NO	N	-	-	-	-	-
24	MH	F	45	41-50	169	69	24	115	62	91	138	90	84	123	65	74	124	76	85	NO		NO	N	-	-	-	-	-
25	KKJ	M	42	41-50	171	72	32	122	68	78	145	81	74	142	76	68	140	84	86	YES	5	YES	lvh	60	225	4.6	140	1
26	BS	M	38	31-40	162	78	29	121	81	63	141	92	64	137	93	68	150	100	72	YES	3	NO	N	-	-	3.5	132	1.2
27	SS	M	40	31-40	171	82	31	132	67	58	154	75	62	147	72	54	150	84	56	YES	3	NO	N	-	-	3.8	146	0.8
28	PK	F	23	20-30	158	67	23	102	59	70	115	67	68	108	63	64	118	76	85	NO		NO	N	-	-	-	-	-
29	RR	F	37	31-40	153	86	38	112	74	84	123	76	72	122	81	82	132	84	82	NO		NO	N	-	-	-	-	-
30	MK	M	39	31-40	162	84	36	112	67	84	126	82	84	123	71	81	130	84	87	NO		NO	N	-	-	-	-	-
31	MK	F	37	31-40	158	72	34	108	72	81	121	82	81	118	76	70	120	80	82	NO		NO	N	-	-	-	-	-
32	BK	F	52	51-60	158	78	32	134	82	87	142	91	92	150	94	86	141	87	77	YES	7	NO	lvh	55	230	3.6	155	1.3
33	JS	M	35	31-40	163	78	34	115	71	82	122	86	86	121	76	87	128	90	92	NO		NO	N	-	-	-	-	-
34	DC	M	57	51-60	168	86	32	111	68	75	125	81	84	118	72	78	134	90	92	NO		NO	N	-	165	4	145	1.1
35	GS	M	40	31-40	162	70	30	108	71	82	127	76	84	124	76	78	130	84	78	NO		NO	N	-	-	-	-	-
36	MK	F	35	31-40	158	68	24	111	72	72	123	84	82	117	76	72	130	80	82	NO		NO	N	-	120	5	142	0.8
37	GK	F	37	31-40	156	78	20	114	70	82	128	78	80	120	76	77	120	80	86	NO		NO	N	-	-	-	-	-
38	DS	M	54	51-60	178	84	30	132	74	86	149	78	80	146	78	80	160	92	90	YES	8	NO	lvh	55LVH	245	4.5	145	1.3
39	PS	F	52	51-60	157	84	28	142	75	83	148	90	77	148	82	78	156	80	84	YES	5	NO	N	-	167	3.2	130	1.2
40	RK	M	37	31-40	178	82	26	113	69	81	126	78	80	119	76	78	134	90	87	NO		NO	N	-	-	-	-	-
41	DS	M	35	31-40	165	92	34	107	72	79	118	78	73	116	75	67	118	80	82	NO		NO	N	-	-	-	-	-
42	BS	F	51	51-60	152	72	23	129	74	84	137	78	82	135	78	78	150	80	87	YES	5	NO	N	-	195	3.8	145	1.1
43	MK	F	55	51-60	150	82	28	131	69	65	152	78	72	142	73	72	150	80	78	YES	5	YES	N	-	175	4.2	155	1
44	MS	M	39	31-40	170	78	24	125	78	80	133	82	76	131	84	81	134	84	85	NO		NO	N	-	-	-	-	-
45	MS	M	39	31-40	173	78	27	122	69	78	136	75	78	134	76	75	136	82	82	NO		NO	N	-	132	3.5	138	0.9
46	DS	M	43	41-50	158	64	28	104	70	73	117	76	74	110	72	74	110	70	84	NO		NO	N	-	-	-	-	-
47	JS	M	40	31-40	152	72	32	118	70	82	138	72	78	135	78	74	152	80	74	YES	3	NO	N	-	254	4.5	146	0.89
48	BK	F	32	31-40	154	70	24	111	71	84	124	86	83	117	76	68	140	82	86	NO		NO	N	-	-	-	-	-
49	HK	F	51	51-60	153	88	27	113	75	72	124	86	84	121	81	78	134	82	84	NO		NO	N	-	-	-	-	-
50	CS	M	53	51-60	174	84	30	122	84	81	131	80	87	130	91	85	120	80	88	NO		NO	N	-	-	-	-	-
51	SKM	M	46	41-50	168	79	27	115	75	64	134	88	58	121	81	78	140	74	89	NO		NO	N	-	134	3.4	146	0.8
52	PS	F	25	20-30	153	68	27	113	67	80	123	73	83	123	72	78	130	80	90	NO		NO	N	-	162	3.6	155	1
53	RK	M	51	51-60	160	98	24	124	81	65	141	87	67	136	86	78	150	90	82	YES	6	NO	lvh	60	158	4.5	138	0.9
54	HS	F	25	20-30	152	76	29	114	77	80	125	83	80	120	83	80	116	76	89	NO		NO	N	-	-	4	136	1.1
55	KK	M	27	20-30	161	82	36	108	62	82	122	76	84	117	68	76	120	80	78	NO		NO	N	-	-	-	-	-
56	LS	F	55	51-60	154	104	39	120	80	60	144	95	67	136	86	80	140	84	92	NO		NO	N	-	-	-	-	-
57	KS	M	45	41-50	158	104	40	113	69	84	133	84	89	122	77	74	134	80	86	NO		NO	N	-	122	3.5	135	1.1
58	RS	M	52	51-60	167	114	45	124	73	96	152	78	89	137	78	70	164	112	76	YES	6	NO	N	-	325	4	140	1
59	GS	M	42	41-50	165	94	42	121	87	56	138	86	60	137	93	70	150	94	78	NO		NO	N	-	-	-	-	-
60	DS	F	22	20-30	154	76	26	105	67	81	125	82	78	114	74	82	120	82	90	NO		NO	N	-	-	-	-	-
61	GS	M	51	51-60	162	78	25	121	61	61	145	83	66	135	67	76	154	100	78	YES	5	NO	N	-	185	4.5	140	1.3
62	RK	M	25	20-30	163	78	30	113	64	85	137	88	76	122	71	80	130	78	89	NO		NO	N	-	-	-	-	-
63	HS	F	34	31-40	152	81	33	122	70	75	135	83	87	131	75	70	140	90	78	NO		NO	N	-	-	-	-	-
64	MS	F	26	20-30	155	76	26	107	69	85	126	82	73	117	72	75	124	76	67	NO		NO	N	-	-	-	-	-

S.NO.	NAME	GENDER	AGE	AGE GROUP	HEIGHT	WEIGHT	ARM CIRUCUM FERENCE	HBPM SYSTOLIC	HBPM DIASTOLIC	HBPM PULSE	OABP SYSTOLIC	OABP DIASTOLIC	OABP PULSE	AOBP SYSTOLIC	AOBP DIASTOLIC	AOBP PULSE	OMBP SYSTOLIC	OMBP DIASTOLIC	OMBP PULSE	HTN	Duration of htn	DM	ECG	ECHO	TOTAL CHOLESTROL	POTASSIUM	SODIUM	CREATININE
65	DS	F	25	20-30	153	68	27	109	66	80	123	73	83	128	72	78	130	80	90	NO		NO	N	-	153	4	138	0.9
66	GS	M	45	41-50	160	98	24	112	78	65	141	87	67	136	86	78	150	90	82	YES	6	NO	lvh	55	125	4.5	140	0.9
67	NS	F	25	20-30	152	76	29	111	73	80	125	83	80	120	80	80	116	76	89	NO		NO	N	-	-	-	-	-
68	JS	M	27	20-30	161	82	36	107	60	82	122	76	84	114	68	76	120	80	78	NO		NO	N	-	-	-	-	-
69	MS	M	51	51-60	170	78	25	131	88	61	167	95	58	154	95	62	154	104	68	YES	5	NO	N	-	245	3.8	145	1.1
70	SK	M	25	20-30	168	78	29	113	64	85	124	76	82	122	71	81	130	78	71	NO		NO	N	-	-	-	-	-
71	AK	F	34	31-40	156	104	30	122	73	82	142	76	78	137	79	70	148	90	82	YES	5	NO	N	-	165	5.2	152	1.2
72	MS	M	26	20-30	172	86	26	109	67	85	121	74	78	117	72	75	124	70	84	NO		NO	N	-	-	-	-	-
73	YP	M	35	31-40	176	77	23	111	81	84	128	92	86	123	97	84	120	90	74	NO		YES	N	-	265	3.5	146	1.2
74	SS	M	32	31-40	170	80	32	134	84	85	140	85	90	160	97	95	150	95	90	YES	3	NO	N	-	278	3.2	132	0.8
75	DPM	M	46	41-50	170	79	27	126	68	63	142	75	61	135	74	58	142	86	64	YES	3	NO	N	-	328	4	146	1.1
76	AP	M	48	41-50	167	88	29	132	76	86	158	104	80	144	99	85	160	104	76	YES	5	NO	N	-	165	5.2	145	1.2
77	BS	M	32	31-40	175	80	30	118	63	75	132	83	70	127	70	72	130	82	85	NO		NO	N	-	-	-	-	-
78	AS	M	31	31-40	170	75	28	131	70	82	129	80	72	121	76	71	130	80	74	NO		NO	N	-	-	-	-	-
79	KK	F	42	41-50	171	92	32	128	80	97	142	93	113	145	89	110	156	96	110	YES	5	NO	N	-	170	5	146	1.1
80	GS	M	41	41-50	163	82	32	127	68	79	125	79	82	122	76	74	130	80	84	NO		NO	N	-	-	-	-	-
81	BR	M	51	51-60	171	89	30	133	72	81	132	91	70	122	81	68	140	84	72	NO		NO	N	-	-	-	-	-
82	ABC	M	45	41-50	168	79	28	123	62	71	124	76	74	118	68	69	120	82	74	NO		NO	N	-	135	3.4	150	0.9
83	RK	M	50	41-50	169	76	30	144	78	87	142	100	104	141	97	101	150	90	87	YES	3	NO	N	-	176	4	152	0.9
84	MS	M	41	41-50	159	79	31	112	64	70	118	71	84	111	67	64	120	78	70	NO		NO	N	-	-	-	-	-
85	SS	M	34	31-40	165	79	30	121	65	75	128	71	74	121	71	88	130	80	70	NO		NO	N	-	-	-	-	-
86	JS	M	31	31-40	165	67	27	129	81	82	125	84	80	130	88	82	115	85	75	NO		NO	N	-	-	-	-	-
87	BS	M	45	41-50	171	60	25	118	74	78	126	86	87	115	80	76	130	80	86	NO		YES	N	-	228	3.5	155	1
88	GS	M	55	51-60	174	103	33	134	81	62	169	95	75	154	97	76	172	89	78	YES	6	NO	N	-	190	4.5	135	1.2
89	JS	M	40	31-40	172	84	34	124	72	77	125	79	77	124	80	72	120	82	72	NO		NO	N	-	-	-	-	-
90	SS	M	34	31-40	168	82	32	118	70	79	124	81	72	122	76	76	130	84	82	NO		NO	N	-	-	-	-	-
91	NS	M	33	31-40	158	70	25	115	68	72	116	71	71	114	73	88	120	78	74	NO		NO	N	-	-	-	-	-
92	RS	M	44	41-50	156	84	32	116	70	71	119	78	76	117	76	76	120	84	82	NO		NO	N	-	-	-	-	-
93	RK	M	54	51-60	168	92	42	134	81	81	146	91	86	143	89	87	150	92	92	YES	5	NO	lvh	60	210	4.5	136	1
94	KS	M	37	31-40	163	94	41	119	76	81	145	85	80	139	83	76	142	92	92	YES	6	NO	N	-	165	5	145	1.2
95	RK	F	45	41-50	152	81	33	121	70	75	135	83	87	131	75	70	140	90	78	YES	3	NO	N	-	150	3.5	140	0.9
96	SK	F	26	20-30	155	76	26	121	68	85	126	82	73	117	72	75	124	76	67	NO		NO	N	-	-	-	-	-
97	JS	M	35	31-40	160	82	32	116	70	87	132	75	85	129	83	79	130	78	87	NO		NO	N	-	-	-	-	-
98	MS	M	40	31-40	172	78	34	118	61	70	119	71	84	111	67	64	120	78	70	NO		NO	N	-	-	-	-	-
99	AS	M	26	20-30	165	75	33	113	65	75	128	68	74	121	71	88	130	80	70	NO		NO	N	-	-	-	-	-
100	AK	F	34	31-40	155	68	29	131	76	82	127	84	80	130	88	82	115	85	74	NO		NO	N	-	-	-	-	-
101	SS	M	30	20-30	170	69	34	102	78	78	126	75	87	115	80	76	130	80	86	NO		NO	N	-	-	-	-	-
102	RK	F	36	31-40	161	70	30	114	79	69	123	73	75	121	73	74	124	72	78	NO		NO	N	-	-	-	-	-
103	AS	M	28	20-30	172	78	35	112	80	77	125	73	75	124	75	72	124	70	72	NO		NO	N	-	-	-	-	-
104	JS	M	31	31-40	168	82	34	113	75	79	124	73	72	121	73	76	130	80	82	NO		NO	N	-	-	-	-	-
105	RK	F	30	20-30	153	65	29	102	72	72	117	72	73	115	73	80	120	80	74	NO		NO	N	-	125	3.6	145	0.9
106	MK	F	27	20-30	157	73	28	108	75	71	119	73	76	117	75	76	120	82	80	NO		NO	N	-	-	-	-	-
107	GS	M	38	31-40	170	78	28	118	68	56	143	85	82	136	79	86	142	80	78	NO		NO	N	-	155	4	150	0.8
108	MS	M	33	31-40	163	75	30	114	77	69	120	86	80	121	73	77	130	80	80	NO		NO	N	-	-	-	-	-
109	RK	M	26	20-30	172	83	29	102	76	62	121	68	65	112	70	60	118	76	69	NO		NO	N	-	-	-	-	-
110	MK	F	35	31-40	155	91	32	115	78	67	123	79	69	122	77	70	130	80	83	NO		NO	N	-	-	-	-	-
111	JS	M	36	31-40	165	78	32	110	70	74	117	83	85	118	75	80	120	78	85	NO		NO	N	-	-	-	-	-
112	HS	F	32	31-40	150	76	31	112	77	78	126	72	67	117	64	62	130	80	58	NO		NO	N	-	145	3.5	155	1
113	RR	F	42	41-50	153	70	34	130	78	72	141	92	82	143	94	83	150	90	84	YES	6	NO	lvh	55	175	3.5	136	1.1
114	MK	M	25	20-30	163	69	34	109	75	77	119	81	74	117	82	72	130	84	74	NO		NO	N	-	-	-	-	-
115	RK	F	33	31-40	158	82	36	113	76	78	131	77	90	127	76	85	130	80	98	NO		NO	N	-	-	-	-	-
116	SK	F	34	31-40	151	72	36	114	66	70	125	75	76	119	75	70	124	88	76	NO		NO	N	-	-	-	-	-
117	JS	M	35	31-40	175	60	32	114	62	76	127	70	90	123	68	75	134	82	78	NO		NO	N	-	-	-	-	-
118	GS	M	30	20-30	170	98	42	119	71	77	131	77	89	127	76	88	140	78	89	NO		NO	N	-	-	-	-	-
119	MK	M	22	20-30	165	88	34	114	69	73	127	77	87	126	75	77	134	84	77	NO		NO	N	-	-	-	-	-
120	AS	F	48	41-50	158	75	34	123	82	65	155	102	60	151	92	57	162	94	64	YES	3	NO	N	-	190	3.8	145	1.1
121	RK	M	21	20-30	173	80	36	112	68	80	123	84	87	119	76	67	134	80	77	NO		NO	N	-	-	-	-	-
122	MS	M	22	20-30	166	78	35	113	70	78	123	75	77	118	75	67	126	78	87	NO		NO	N	-	-	-	-	-
123	JR	M	32	31-40	175	64	28	102	70	73	117	76	78	112	73	67	122	80	77	NO		NO	N	-	-	-	-	-
124	AS	M	33	31-40	170	84	32	111	60	71	123	83	84	121	68	76	132	80	77	NO		NO	N	-	-	-	-	-
125	PS	M	26	20-30	181	91	32	122	67	79	133	78	88	131	73	79	120	80	82	NO		NO	N	-	-	-	-	-
126	DS	M	39	31-40	169	56.1	27	106	70	67	115	78	71	115	72	74	120	70	70	NO		NO	N	-	-	-	-	-
127	BS	M	35	31-40	168	88	32	118	69	73	132	79	74	128	76	74	130	82	84	YES	3	NO	N	-	185	3.5	132	0.9
128	SS	M	32	31-40	182	89	30	122	70	73	131	96	82	130	74	78	150	80	80	NO		NO	N	-	190	4	145	1

S.NO.	NAME	GENDER	AGE	AGE GROUP	HEIGHT	WEIGHT	ARM CIRUCUM FERENCE	HBPM SYSTOLIC	HBPM DIASTOLIC	HBPM PULSE	OABP SYSTOLIC	OABP DIASTOLIC	OABP PULSE	AOBP SYSTOLIC	AOBP DIASTOLIC	AOBP PULSE	OMBP SYSTOLIC	OMBP DIASTOLIC	OMBP PULSE	HTN	Duration of htn	DM	ECG	ECHO	TOTAL CHOLESTROL	POTASSIUM	SODIUM	CREATININE
129	KS	M	47	41-50	180	72	27	127	80	81	151	94	98	146	92	89	150	100	86	YES	6	NO	N	-	210	4.5	150	1.2
130	PK	M	54	51-60	180	90	31	139	81	73	154	97	78	146	92	74	150	94	74	YES	6	YES	N	-	245	3.5	145	1.3
131	N	M	22	20-30	160	72	30	100	60	73	114	64	73	107	62	72	100	70	72	NO		NO	N	-	-	-	-	-
132	RS	M	34	31-40	182	86	30	113	65	77	128	74	62	122	71	59	124	70	84	NO		NO	N	-	-	-	-	-
133	S	M	39	31-40	170	80	32	126	86	100	131	94	101	133	102	102	130	90	102	NO		NO	N	-	165	3.8	136	1
134	MS	M	29	20-30	172	89	34	114	70	73	125	79	76	118	75	77	130	86	82	NO		NO	N	-	-	-	-	-
135	MK	F	24	20-30	162	67	30	115	70	82	127	90	76	122	76	77	130	90	82	NO		NO	N	-	-	-	-	-
136	SS	M	42	41-50	172	84	38	124	70	74	132	76	69	130	74	69	140	84	67	NO		NO	N	-	-	-	-	-
137	GK	M	55	51-60	174	73	27	132	66	71	135	91	73	137	87	75	140	86	67	YES	7	NO	lvh	60	245	3.2	136	1.1
138	JS	M	39	31-40	171	68	26	116	80	79	124	81	75	120	86	77	110	80	76	NO		NO	N	-	-	-	-	-
139	BS	M	38	31-40	167	78	34	131	84	63	151	98	77	138	93	64	146	90	77	YES	3	NO	N	-	190	4.5	145	1
140	DS	M	23	20-30	174	82	38	112	70	56	132	71	76	118	73	64	130	80	78	NO		NO	N	-	-	-	-	-
141	PK	F	35	31-40	165	88	42	133	72	69	146	86	79	140	85	77	130	110	88	YES	5	NO	N	-	195	3.5	135	1.2
142	HS	M	26	20-30	180	104	29	102	66	62	118	69	65	110	70	60	117	74	69	NO		NO	N	-	-	-	-	-
143	KS	M	35	31-40	184	91	32	119	81	67	140	90	69	127	89	69	144	82	70	YES	3	NO	N	-	150	5	146	1
144	HS	M	49	41-50	177	86	34	117	70	74	111	83	85	124	79	84	112	78	85	NO		YES	N	-	320	3.8	146	1.2
145	BK	F	32	31-40	152	70	30	108	71	76	124	72	64	117	56	78	152	70	77	NO		NO	N	-	150	5	150	1
146	GS	M	42	41-50	168	98	28	132	70	72	160	78	80	169	80	83	160	80	72	YES	6	NO	N	-	170	3.5	134	0.8
147	SA	F	25	20-30	159	69	29	104	76	77	119	81	74	116	82	72	120	80	74	NO		NO	N	-	-	-	-	-
148	SM	F	42	41-50	152	83	32	132	81	62	129	85	57	142	89	58	146	90	56	YES	5	NO	N	-	180	4.5	142	1.1
149	SS	M	29	20-30	171	72	29	112	71	72	131	79	73	119	77	70	114	88	66	NO		NO	N	-	-	-	-	-
150	KK	F	35	31-40	156	53	22	117	68	71	142	82	82	125	76	77	160	60	76	YES	3	NO	N	-	160	4	145	1
151	DR AV	M	28	20-30	167	77	34	109	73	73	128	76	77	118	76	67	130	90	67	NO		NO	N	-	-	-	-	-
152	AK	M	48	41-50	159	78	25	122	75	73	128	83	66	133	83	65	122	82	67	NO		NO	N	-	-	-	-	-
153	RM	F	25	20-30	158	89	34	102	70	83	122	76	75	110	74	76	120	78	77	NO		NO	N	-	-	-	-	-
154	MS	M	29	20-30	170	78	24	124	71	80	134	84	77	140	79	76	140	84	86	NO		NO	N	-	-	-	-	-
155	RK	M	29	20-30	175	88	27	120	73	78	136	82	70	128	76	72	130	86	67	NO		NO	N	-	-	-	-	-
156	DS	M	35	31-40	165	64	22	109	71	73	118	76	76	116	73	72	120	82	77	NO		NO	N	-	-	-	-	-
157	KK	M	46	41-50	165	88	22	113	81	71	118	89	75	124	87	67	130	90	86	YES	5	NO	N	-	175	4.5	140	0.8
158	DS	M	45	41-50	169	69	24	109	72	91	138	90	65	118	78	66	134	80	78	NO		NO	N	-	-	-	-	-
159	KK	F	37	31-40	154	78	20	135	70	72	141	72	64	146	67	70	152	70	77	YES	3	NO	N	-	210	3.5	136	1
160	BK	F	54	51-60	148	84	30	142	72	63	160	78	80	169	80	83	160	80	72	YES	10	NO	lvh	55	190	3.2	135	1.3
161	SS	F	25	20-30	150	84	28	109	80	78	119	81	74	116	82	72	120	80	74	NO		NO	N	-	-	-	-	-
162	PK	M	37	31-40	152	82	26	131	78	70	129	80	91	142	89	85	146	90	92	NO		NO	N	-	165	4.5	145	1
163	RR	F	34	31-40	150	92	32	114	75	75	123	83	70	121	81	70	134	86	92	NO		NO	N	-	-	-	-	-
164	GK	F	51	51-60	148	72	23	104	71	79	132	80	87	124	76	76	130	84	90	NO		NO	N	-	210	4	145	1
165	MK	M	55	51-60	152	82	28	117	70	72	132	78	78	124	76	78	130	80	92	NO		NO	N	-	-	-	-	-
166	MK	F	25	20-30	158	68	20	106	60	80	124	72	64	117	56	72	134	70	77	NO		NO	N	-	-	-	-	-
167	MK	F	51	51-60	164	98	24	142	72	89	160	78	80	169	80	83	160	80	72	YES	5	NO	N	-	160	5.2	150	1.2
168	RG	M	25	20-30	164	89	22	104	77	58	119	81	74	116	82	72	120	80	74	NO		NO	N	-	-	-	-	-
169	KKJ	F	27	20-30	162	58	17	112	74	72	129	80	91	131	89	85	146	90	92	NO		NO	N	-	135	3.6	152	1
170	RS	M	55	51-60	158	104	18	114	72	87	123	83	70	121	81	70	134	90	92	NO		NO	N	-	-	-	-	-
171	DS	M	35	31-40	152	104	32	121	71	85	132	76	69	130	74	69	140	84	67	NO		NO	N	-	-	-	-	-
172	SR	F	52	51-60	164	114	38	101	71	85	135	88	73	110	76	75	116	74	67	NO		YES	N	-	240	4.5	136	0.8
173	MS	M	39	31-40	170	78	24	118	75	80	133	89	78	127	84	78	134	84	74	NO		NO	N	-	-	-	-	-
174	RS	M	39	31-40	173	78	27	122	80	78	144	86	79	133	85	77	130	84	78	NO		NO	N	-	-	-	-	-
175	AR	F	50	41-50	163	75	27	114	70	81	110	70	80	121	75	75	136	80	70	NO		NO	N	-	-	-	-	-
176	PS	M	27	20-30	177	82	29	121	82	101	129	90	96	136	90	94	122	86	94	NO		NO	N	-	-	-	-	-
177	SK	M	24	20-30	180	67	26	114	70	89	115	70	90	121	70	84	110	60	80	NO		NO	N	-	160	4.5	145	1
178	GS	M	26	20-30	176	68	26	109	76	95	118	76	92	119	80	90	122	78	92	NO		NO	N	-	155	4	140	0.9
179	PS	M	37	31-40	168	92	34	121	84	101	131	83	84	136	94	92	140	90	96	NO		NO	N	-	160	4.5	136	1
180	SK	M	35	31-40	162	84	32	104	66	89	109	68	75	111	67	72	118	70	84	NO		NO	N	-	-	-	-	-
181	VAJ	M	29	20-30	178	85	31	121	71	74	131	93	85	136	79	84	132	78	84	NO		NO	N	-	-	-	-	-
182	AK	M	26	20-30	175	78	15	115	68	70	121	72	75	122	73	80	120	70	86	NO		NO	N	-	-	-	-	-
183	TS	M	49	41-50	162	87	34	120	70	83	132	87	82	131	82	81	130	84	80	NO		NO	N	-	-	-	-	-
184	AS	M	22	20-30	183	89	34	110	71	64	128	78	55	121	69	60	126	70	60	NO		NO	N	-	-	-	-	-
185	HS	M	20	20-30	189	74	33	121	70	88	128	79	86	129	79	87	130	80	89	NO		NO	N	-	-	-	-	-
186	RK	M	27	20-30	170	82	29	114	71	79	122	124	70	121	85	78	130	82	84	NO		NO	N	-	-	-	-	-
187	MS	M	30	20-30	172	78	30	100	71	78	118	74	85	106	74	90	124	74	86	NO		NO	N	-	140	4.5	145	1.2
188	VG	F	34	31-40	156	67	32	102	70	72	117	72	62	106	71	63	120	83	84	NO		NO	N	-	-	-	-	-
189	GS	M	26	20-30	170	68	24	112	77	77	125	75	73	123	80	77	124	78	82	NO		NO	N	-	-	-	-	-
190	RK	M	36	31-40	160	82	31	114	74	74	117	79	86	121	82	80	124	90	103	NO		NO	N	-	125	5	135	1
191	GS	M	31	31-40	169	65	26	102	73	77	113	71	80	114	72	83	120	70	86	NO		NO	N	-	-	-	-	-
192	AS	M	29	20-30	175	84	27	101	63	81	107	75	80	110	70	72	115	71	73	NO		NO	N	-	-	-	-	-

S.NO.	NAME	GENDER	AGE	AGE GROUP	HEIGHT	WEIGHT	ARM CIRUCUM FERENCE	HBPM SYSTOLIC	HBPM DIASTOLIC	HBPM PULSE	OABP SYSTOLIC	OABP DIASTOLIC	OABP PULSE	AOBP SYSTOLIC	AOBP DIASTOLIC	AOBP PULSE	OMBP SYSTOLIC	OMBP DIASTOLIC	OMBP PULSE	HTN	Duration of htn	DM	ECG	ECHO	TOTAL CHOLESTROL	POTASSIUM	SODIUM	CREATININE
193	A	F	47	41-50	176	78	27	113	70	82	127	82	74	130	80	72	136	83	92	NO		NO	N	-	160	3.5	145	0.8
194	KK	F	35	31-40	162	55	28	126	77	74	138	85	70	135	80	73	138	84	84	NO		NO	N	-	-	-	-	-
195	PK	F	45	41-50	152	38	20	123	68	83	138	68	72	136	72	84	140	74	79	NO		YES	N	-	190	4.5	150	1.2
196	RK	F	32	31-40	153	72	38	114	71	84	121	74	72	125	76	82	126	74	82	NO		NO	N	-	-	-	-	-
197	MS	M	40	31-40	162	84	36	116	68	84	125	81	85	125	71	81	132	84	87	NO		NO	N	-	-	-	-	-
198	MK	F	38	31-40	157	65	34	107	70	81	123	79	80	119	76	72	124	80	82	NO		NO	N	-	-	-	-	-
199	DS	F	50	41-50	156	71	32	128	82	87	143	90	92	146	89	86	150	87	77	NO		NO	N	-	-	-	-	-
200	GL	M	37	31-40	163	78	34	108	73	82	123	86	86	120	76	87	124	90	92	NO		NO	N	-	-	-	-	-

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Date 19/3/19

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 31.08.2018 has approved the plan of thesis of Gurpreet Singh, a student of your college for DM Cardiology along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Study to compare the home, office and automatic office blood pressure recordings

Supervisor
Dr. Gurpreet Singh Wander
Prof. & Head,
Dept. of Cardiology,
DMCH, Ludhiana.

Co-Supervisor
Dr. Bishav Mohan
Prof.,
Dept. of Cardiology,
DMCH, Ludhiana.

Dr. Naved Aslam
Prof.,
Dept. of Cardiology,
DMCH, Ludhiana.

The student has to submit the four copies of thesis, to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

SP Singh

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

1. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED IN

PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTORATE OF MEDICINE

In

CARDIOLOGY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

FEBRUARY, 2018

DR GURPREET SINGH

DEPARTMENT OF CARDIOLOGY

DAYANAND MEDICAL COLLEGE AND HOSPITAL

LUDHIANA

ABSTRACT OF PLAN OF THESIS

TITLE	STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS
DEGREE	DM CARDIOLOGY
NAME OF THE CANDIDATE	DR GURPREET SINGH
SUPERVISOR	DR GURPREET SINGH WANDER
CO – SUPERVISOR	DR BISHAV MOHAN
CO – SUPERVISOR	DR NAVED ASLAM
INSTITUTION	DAYANAND MEDICAL COLLEGE AND HOSPITAL, LUDHIANA
UNIVERSITY	BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

INTRODUCTION: Blood pressure measurements taken in a clinical setting have been observed to be higher in patients when compared to measurements made in a home or ambulatory setting, a phenomenon termed 'white coat effect'. Subject with white coat HTN are at marginally increased cardio vascular risk and also at increased risk to develop sustained HTN.
On the other hand masked HTN is increase the risk of CV events similar to uncontrolled HTN.
There has not been sufficient research into whether the variation in blood pressure measurement observed is due to clinical/office setting, or due to physician presence.
So in this study recording BP by automated office BP (AOBP) measurement done and its is comparison with reading at home and office done to assess the real hypertension burden, so that cardiovascular morbidity minimized with effective control of hypertension.

AIM OF STUDY: To determine is there difference between home, office and automatic office blood pressure readings.

MATERIALS & METHODS: in this 200 individuals will be recruited. First digital sphygmomanometer reading taken at home by the individual themselves and in office by observer, than BP monitored at office with automatic blood pressure monitor, average of all these reading will be compared.

CLINICAL SIGNIFICANCE: There are different techniques to measure the blood pressure as manual and automatic, so there might be variation in readings of these techniques. On the other hand white coat hypertension and masked hypertension are factor that leads to variation in blood pressure readings. These factors cause inaccurate staging of hypertension and produces discrepancy in hypertension related trails and shortcomings in treatment protocol of hypertension. So to produce more accurate in results in trials and for good treatment strategies correlation of different techniques to monitor the blood pressure is required.

KEYWORDS - Frequently Relapsing Hypertension HT, automatic office blood pressure monitor AOBM.

(Signature)	(Signature)	(Signature)	(Signature)	(Signature)
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CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS"** exist in the Department of Cardiology, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate himself/herself under our supervision and guidance.

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Department	Cardiology
Topic of Thesis	**STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS**
Likely date of appearing in PG examination	May 2020
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2. HOD Surgery	2. HOD Pathology
3. HOD Pathology	3. HOD Pharmacology
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Approved: Yes / ~~No~~

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PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

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5	TITLE OF THE TOPIC	STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Blood pressure measurements taken in a clinical setting have been observed to be higher in patients when compared to measurements made in a home or ambulatory setting, a phenomenon termed 'white coat effect'. White coat hypertension is defined as office hypertension with ambulatory or home normotension.[1] It is believed that the phenomenon is due to the anxiety during a clinic visit.[2]

This is supported by studies that repeatedly indicate that 15%–30% of those thought to have mild hypertension as a result of clinic or office recordings display normal blood pressure and no unusual response to pressure stimulus. These persons did not show any specific characteristics such as age that may be indicative of a higher susceptibility to white coat hypertension.[3]

- Subject with white coat HTN are at marginally increased cv risk and also at increased risk to develop sustained HTN.
- On the other hand masked HTN is increase the risk of CV events similar to uncontrolled HTN.
- So it is always necessary to consider the office and home blood pressuring accurate reading to access the actual cardio vascular risk burden.

Till date, there has not been sufficient research into whether the increased blood pressure measurement observed as a result of white coat effect is due to clinical or office setting, or whether it is due to physician presence.

Another option for recording BP is automated office BP (AOBP) measurement, in which a fully automated device records multiple BP readings with no interaction between the patient and physician or nurse as the observer having left the patient alone and seated in a quiet room. Individual and mean BP readings can be obtained after several minutes with the patient, who is less likely to exhibit a white-coat reaction associated with the presence of a health professional. Compared with routine manual office BP measurement, AOBP correlates more strongly with awake ambulatory BP measurement, shows less digit preference, is more consistent from visit to visit, is similar both within and outside of the physician's office, virtually eliminates office-induced hypertension, and is associated with less masked hypertension.

This approach simplifies the diagnosis of hypertension in contrast to manual BP measurement.

As a result of the implications and ramifications of the white coat effect, we need to examine whether the effect is due to the physician presence, clinical setting or both. By identifying the cause of the transient increase in blood pressure, steps can be taken to mitigate the magnitude of the effect so that more accurate blood pressure measurements can be made.

6.2 REVIEW OF LITERATURE

Blood pressure measurements taken in a clinical setting have been observed to be higher in patients when compared to measurements made in a home or ambulatory settings, a phenomenon termed 'white coat effect' which is defined as office hypertension with ambulatory or home normotension. It is believed that the phenomenon is due to anxiety during a clinical visit.

Self-measurement of blood pressure (BP) at home (home BP), a technique that makes it possible to obtain multiple measurements under well-controlled conditions, is more reliable than conventional (office) BP measurement, since it avoids both observer and regression dilution biases and eliminates the white-coat effect.[4] Previous cross-sectional studies and a prospective cohort study have also shown that home BP measurement has a stronger predictive power for target organ damage, morbidity, and mortality than has conventional BP measurement.[5] It has also been shown that home BP measurement is the best method for evaluating the BP-lowering effect of antihypertensive agents in clinical trials.[6] Because of the above benefits, home BP measurement is now widely practiced in developed countries. Several national and international guidelines also recommend its use for better management of hypertension.[7,8] Although some population studies have examined BP control as measured at home, the number of treated hypertensive patients in these cohorts was not sufficient to allow detailed analysis according to the subjects' characteristics.[9] Only a few studies have examined the characteristics of BP control based on home BP level among hypertensive patients receiving antihypertensive medication.[10]

Despite intensive efforts to promote proper techniques for the measurement of blood pressure, widespread concern about the quality and accuracy of blood pressure measurement in "real life" clinical settings continues.[11,12] Studies from routine clinical practice often report imprecise and inconsistent manual office blood pressure readings owing to poor measurement technique, patient-physician interaction such as conversation during readings, and failure to minimise patient related factors such as anxiety.[13,14] Recent studies suggest that an accurate office blood pressure reading requires at least 14 minutes, including a period of rest before the first measurement.[15,16] The likelihood of such careful adherence to protocols for blood pressure measurement in routine, community based, office practice would seem to be low.

In recognising these concerns about manual office blood pressure measurement, some experts in hypertension have recently recommended a more limited role for such readings. Proposals for improved assessment of blood pressure status include greater reliance on home and 24 hour ambulatory blood pressure monitoring.[17,18] Not only do out of office readings eliminate increased readings associated with conventional manual office blood pressure measurement (the white coat response), they are also stronger predictors of future cardiovascular events.[19,20] Detection and elimination of the white coat response also reduces the number of patients who receive unnecessary drug treatment.[21]

Although the evidence supporting greater use of home and 24 hour ambulatory blood pressure monitoring is substantial, to consider abandoning office blood pressure measurement because of the deficiencies associated

with conventional manual office readings is both premature and unwise. Recent advances in the development of automated sphygmomanometers provide a third option for accurate assessment of blood pressure status: automated office blood pressure measurement. The use of independently validated, fully automated sphygmomanometers designed for professional use reduces or eliminates many of the factors contributing to imprecise blood pressure readings in routine clinical practice.[22,23] Self measurement with the patient resting alone in a quiet examining room makes it possible to eliminate patient-observer interaction such as conversation, an important cause of the white coat response.[24,25] The absence of a health professional during blood pressure measurement also seems to reduce the anxiety that many patients experience during visits to their doctor.[26,27]

Studies comparing manual with automated office blood pressure have clearly shown that the increase in blood pressure associated with conventional manual office measurement can be eliminated if the three basic tenets of automated office blood pressure are followed: the patient rests alone in a quiet room, and multiple readings are taken with a fully automated device.[28] The simple presence of an observer seems to increase blood pressure, as marked decreases in automated office blood pressure are evident within two minutes of the observer leaving the room.[28]

Manual blood pressure also very much depends on the circumstances in which readings are taken. Pressure is higher when taken by physicians than by nurses, higher in treatment settings than in non-treatment settings, and lower when taken at home.[29] Manual office blood pressure can be 15-18 mm Hg higher than the awake ambulatory blood pressure if recorded in routine

clinical practice. In contrast, automated office blood pressure and awake ambulatory blood pressure generally differ by less than 3 mm Hg, both in research settings and in clinical practice, as seen in CAMBO.[28] Manual blood pressure also decreases if a patient moves from the physician's office to a non-treatment setting such as an ambulatory blood pressure monitoring unit,[29] whereas automated office blood pressure does not fall.[30]

Due to variation in BP measurements seen in various studies in home vs office BP and automated vs manual BP there is a need for a study that can specifically address the issue of variation in various techniques available for measurement of blood pressure and to study the effect of white coat hypertension. Accurate measurement of blood pressure is necessary to formulate guidelines for control of hypertension and guiding the treatment in clinical as well as community settings.

6.3 AIMS AND OBJECTIVES OF THE STUDY

1. To study the difference in measured blood pressure between home setting and office setting.

7. MATERIALS AND METHODS

7.1 SOURCE OF DATA

200 OPD patients from the Department of Medicine and Department of Cardiology, of Dayanand Medical College & Hospital, Ludhiana with with hypertension on treatment and normotensive at the time of screening will be enrolled.

7.2 METHODS OF COLLECTION OF DATA

200 OPD person normotensive or hypertension stage 1 will be included in the study. The particulars of the patients will be recorded in a proforma sheet.

Blood pressure recordings by the patients will be made using a digital sphygmomanometer.

Recruited patients will be provided a digital sphygmomanometer for 3 days. Patient will be educated on how to take blood pressure recordings. Patient will be instructed to take blood pressure readings 2 times each day (with instructions to take the BP recordings at the same time each day) for 3 consecutive days. Patient will be educated to avoid tea, coffee, alcohol, drugs and cigarettes 30 minutes prior to taking a blood pressure reading, making sure to rest for 5 minutes prior to taking BP measurement; resting their arm on a table with their arm supported at the level of their heart; and instructions on how to place the blood pressure cuff on their right arm. Patient will be directed to write down the measurements recorded by blood pressure machine in the proforma sheet.

On the 4th day, patients will be instructed to come to the office on one of the times they were taking their home blood pressure measurements and average of these home readings included in study.

In office two readings will be taken with digital sphygmomanometer that is used by patient at home and average of two readings will be taken.

In office two manual blood pressure readings were taken by clinician with aneroid B.P apparatus and average of these two readings included in study.

After taking the blood pressure reading by the clinician blood pressure reading taken with automated blood pressure monitor (Omron Hem 907) three reading will be taken by monitor and than an average final reading considered in study. All the data will be recorded on a Performa sheet.

All the patients fulfilling the inclusion and none of the exclusion criteria will be included in the study.

Inclusion criteria

- Person normotensive or hypertensive stage-1.
- Patients with hypertension stage 2 and 3 whose treatment remains stable for last 1 month

Exclusion criteria

- Patients who are not able to follow protocol instructions.
- Person with arrhythmias.
- Patients whose treatment modified within last 1 month

NUMBER OF CASES

200 OPD patients from the Department of Medicine and Department of Cardiology, of Dayanand Medical College & Hospital, Ludhiana

OUTCOME

As per the results at the completion of study.

STATISTICAL ANALYSIS

Frequency distribution will be reported. Descriptive analysis will be done. Statistics will be reported as Mean ± SD and count as n (%). Student 't' test

and chi square test will be used. p value ≤0.05 will be significant. Data will be analysed using intercooled stata 9.2 statistical software.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

None

7.4 HAS ETHICAL CLEARENCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Yes, Attached along with.

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PROFORMA

Sn. No. _____

Name Age Sex

CR No.

Address

Mobile No.

Occupation

PRESENT COMPLAINTS

Dyspnoea

Palpitations

Chest pain

Edema feet

Urinary complaints

Any other complaints

PAST HISTORY

- Diabetes
- Coronary artery disease
- Stroke
- Chronic kidney disease
- Any other major illness

Signature of Candidate **Signature of Supervisor**

GENERAL PHYSICAL EXAMINATION

Height	Weight	BMI
Pallor	Icterus	JVP
Pulse Rate	Edema	

SYSTEMIC EXAMINATION

CVS

CHEST

P/A

CNS

Signature of Candidate **Signature of Supervisor**

INVESTIGATIONS (IF DONE)

Hb

TLC

DLC

Fasting blood sugar

Urea

Creatinine

Electrolytes (Na, K, Cl)

Bilirubin Total

Bilirubin Direct

SGOT

SGPT

Alkaline Phosphatase

Total Cholestrol

Triglycerides

HDL Cholestrol

LDL Cholestrol

TSH

Urine routine

ECG

Chest x-ray

2D- Echo

Any other investigation

Signature of Candidate **Signature of Supervisor**

BLOOD PRESSURE RECORDINGS AT HOME

(BY DIGITAL SPHYGMOMANOMETER)

Days	Date	Morning BP recording		Evening BP recording		Average BP reading
		TIME	B.P.	TIME	B.P.	
DAY-1						
DAY-2						
DAY-3						
DAY-4						
Avg BP						

BLOOD PRESSURE RECORDINGS AT THE HOSPITAL

Day 5	Date	Time	Readings	Average BP
BP recording by Patient with Digital sphygmomanometer				
BP recording by automatic office Blood pressure monitor (Omron hem 907)				
BP recording by Clinician with Manual sphygmomanometer				

Signature of Candidate

Signature of Supervisor

PERFORMA TO BE FILLED BY PATIENT AT HOME

Name Age

Sex

CR No.

Address

Mobile No.

Occupation

BLOOD PRESSURE RECORDINGS AT HOME

(BY DIGITAL SPHYGMOMANOMETER)

Days	Date	Morning BP recording		Evening BP recording		Average BP reading
		TIME	B.P.	TIME	B.P.	
DAY-1						
DAY-2						
DAY-3						
DAY-4						
Average BP reading						

Signature of Candidate **Signature of Supervisor**

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

.....am willing to participate in the study **"STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

Signature of Candidate

Signature of Supervisor

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ _____

गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"STUDY TO COMPARE THE HOME, OFFICE AND AUTOMATIC OFFICE BLOOD PRESSURE RECORDINGS" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

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ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

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ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

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ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ